COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper — Second-class postage paid at Boston, Mass., and additional mailing offices — © 1975 by Computerworld, Inc.

ar — October 22, 1975 — Vol. IX, No. 43

NEWSPAPER

But DP Work to Open Up Automation to Hurt N.E. Job Mart

By Nancy French
Of the CW Staff

BOSTON – The number of jobs for clerks and unskilled workers will decline faster in New England than in the U.S. as a whole by 1980, largely because of increasing automation in the area, according to a report published by the Department of Labor here recently.

But while the report predicted a grim job market for clerical workers here, it forecasted a healthy growth in opportunities for computer programmers, analysts, operators and other DP specialists, since New England has one of the heaviest concentrations of computers in the nation.

The regional employment gain for all job categories will be held to a modest 12% compared with the national average of 22%, not only because of automation but also because of another factor – the withering industrial base brought on by the high cost of doing business in the region, a spokesman said.

The total number of employed persons in New England is expected to increase from 4.8 million in 1970 to a projected 5.3 million in 1980, a gain of 568,000, according to Wendell D. Macdonald, of the Bureau of Labor Statistics' regional office, here.

During this same 10-year period, total U.S. employment is expected to increase by more than 17 million jobs, from 78.6 million to 95.8 million by 1980.

The largest gain of any major occupational group between 1970 and 1980 in New England is expected among the region's white-collar workers – especially in the professional and technical occupations, the report said.

Work "in the region's research firms and laboratories, the solving of social problems and the need to operate and maintain a growing number of computers will all require trained professional and technical workers," the report said.

By the end of 1980, the total number of clerical workers should reach more than 1 million, or 19% of the work force, making it the largest occupational group in the region as well as in the U.S. as a whole.

However, in both the region and the nation, the growth rate in this category will be slower in the latter half of the decade than during the first five years.

"Many clerical occupations will continue to be eliminated by the use of computers as they assume the routine and repetitive operations formerly done man-

(Continued on Page 2)

IMS Problem Solving Not 'Bitpickers' Job

By Don Leavitt
Of the CW Staff

SAN FRANCISCO – The traditional approach to a performance problem involving anything as complex as IBM's IMS is to consider it a job for systems programmers with no user or application programmer/analyst involvement and little, if any, management effort.

In this view, "these people do not understand the situation, so it must be the

Coverage of the Computer Measurement Group meeting continues on Pages 13, 14 and 15.

'bitpickers' that make the beast run better," IMS/VS evaluation manager Rich Maday of Michigan Blue Cross/Blue Shield told the recent Computer Measurement Group conference.

But, he added a bit later, this traditional approach isn't really good enough any more.

In the traditional way of doing things, IMS tuning was reaction-oriented. "Nobody would tune a system that was running well. IMS would have to fall on its face" before much attention was paid to

(Continued on Page 5)

Privacy Laws Seen Forcing Defensive DP

By Ronald A. Frank
Of the CW Staff

QUEBEC CITY – As the scope of privacy legislation expands, users will have to begin practicing the defensive use of computers in much the same way that doctors guard against malpractice suits, attorney Ronald Winkler said at the recent Data Communications Symposium here.

Although legal challenges are still rare, this is bound to change as suits are filed

Data Symposium coverage continues on Pages 17 and 18.

in the area of privacy and data security. When this happens, the testimony of expert witnesses will become "very influential" in the courts because of the technical subject matter involved, Winkler said.

These types of court challenges will hinge on whether the user took the necessary protective steps in advance to avoid compromising the computerized information, he said.

The courts will have to answer such questions as: Was the danger identified and known in advance? Was the solution identified and known in advance? What is

(Continued on Page 2)

Appeals Court to Hear IBM Writ Protesting Actions of Edelstein

By Edith Holmes
Of the CW Staff

NEW YORK – IBM's request that the Second Circuit Court of Appeals review decisions and actions taken by the federal district court judge hearing the government's antitrust suit against the coporation [CW, Oct. 15] will be considered in a hearing scheduled for Oct. 22 here.

Consisting of a 25-page brief and lengthy appendices, the writ of mandamus filed by IBM with the court will remain sealed at the request of the Department of Justice until the hearing [CW, Oct. 15].

The writ used extremely strong language in describing the actions of Judge David N. Edelstein in the courtroom.

Written by Paul Dodyk of IBM's outside law firm, Cravath, Swaine and Moore, it called those actions not only "arbitrary and unlawful," but also "outrageous."

Edelstein's rulings have been "unauthorized, unprecedented and highly disruptive" in the course of the trial, the writ said.

In a cover letter, lead IBM attorney Thomas D. Barr claimed the orders of the judge have inflicted "irreparable injury upon our capacity to present a defense."

The use of a writ of mandamus is highly unusual, since it basically asks the appeals court to order Edelstein to obey the law as it is written and to instruct him on the bounds of his discretion under the law.

In addition, the extraordinary writ asks the court of appeals to discipline Edelstein, the sole arbiter in U.S. vs. IBM, for what IBM counsel termed "misconduct" in issuing orders which attorneys for the

(Continued on Page 3)

ACM Membership Tops 30,000; Psychological Factors Credited

By Catherine Arnst
From the CW Staff

CAMBRIDGE, Mass. – The membership of the Association for Computing Machinery (ACM) has topped 30,000, "which I believe makes it the first society servicing the information-processing community to reach that number," according to Jean Sammet, president of the organization.

This is in marked contrast to June, 1974, when membership figures were reported holding steady at approximately 28,000 in the face of a 20% growth rate in the industry [CW, Nov. 13].

"This membership growth occurred without any particular promotion and gimmicks such as contests," Sammet noted. She attributed the increase to several psychological factors and a few practical ones.

"There is a significant improvement in our financial condition," she said, explaining ACM had a surplus in its budget for 1975 that helped because "nobody wants to join an organization which is clearly in financial difficulty."

In addition, "there has been improved handling of questions, problems and complaints and more efficiency in doing things right the first time, such as address changes," she said.

"The opinion survey and secondarily the membership profile that comes with each member's renewal form have demonstrated concern by the leaders for membership opinion; the indication of clear-cut directions from the Long-Range Planning Committee [LRPC] have also helped," she said.

On the practical side, "the effect of being able to reinstate services we had cut

(Continued on Page 6)

Xerox, Honeywell Ink Upkeep Pact

By Nancy French
Of the CW Staff

MINNEAPOLIS – Xerox computer users throughout the U.S. and overseas may find their systems being serviced by Honeywell field engineers if the two companies consummate the deal outlined in a letter of agreement both signed last week.

Details of the transaction will be made public by Dec. 1, the firms said in a joint statement, and the arrangement will become effective Jan. 1.

Under the proposed agreement, Honeywell will "handle all contacts with Xerox computer customers and provide continuing marketing, sales and maintenance support to Xerox computer users."

Xerox will continue to operate its mainframe computer manufacturing facilities in El Segundo, Calif., "into 1976" to produce equipment currently on order and spare parts.

Honeywell sales personnel will handle installations of equipment on order as well as sell or lease any equipment returned from lease customers for an indefinite period, a Xerox source said.

Xerox will continue hardware and software engineering through 1976; after that, this activity will also be taken over by Honeywell, the statement said.

Honeywell anticipates employing "a substantial" proportion of the Xerox marketing, maintenance and development personnel in both North America and overseas, the statement added.

All maintenance revenue is expected to be retained by Honeywell. However, the two will "share," in some fashion still to be determined, revenues from leases and installment sales of Xerox computers and from any future Honeywell sales of Xerox com-

(Continued on Page 4)

Goes on the Road

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Second-class postage paid at Boston, Mass., and additional mailing offices. Published weekly (except: a single combined issue for the last week in December and the first week in January) by Computerworld, Inc., 797 Washington St., Newton, Mass. 02160.

Computerworld can be purchased on 35mm microfilm in half-volumes (six-month periods) through University Microfilm, Periodical Entry Dept., 300 Zeeb Rd., Ann Arbor, Mich. 48106. Phone: (313) 761-4700.

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POSTMASTER: Send Form 3579 (Change of Address) to Computerworld Circulation Dept., 797 Washington St., Newton, Massachusetts 02160.

By 1980, Labor Says

Automation to Hit New England Workers

(Continued from Page 1)

ually by payroll, accounting, inventory and billing clerks," the report said.

"On the other hand, the wide use of electronic data processing requires a greater number of operators and related workers to prepare material for the computer," the report noted.

Estimates provided by Massachusetts, where more than half the region's work force is employed, indicated industries within this state that employed 11,885 computer specialists in 1970 will be employing 15,085 by 1980, for an increase of 26.9%.

Programmers, who accounted for 7,802 members of Massachusetts' work force in 1970, will account for 9,502 members of it by 1980, an expansion of 21.7%; and systems analysts, who held 3,477 jobs in the state in 1970, will increase in number to 4,777 by 1980, for a 37% jump.

Computer and peripherals equipment operators, who numbered 4,738 in 1970 will claim 6,738 jobs in 1980, representing a 44% gain.

Keypunch operators, who accounted for 12,243 jobs in 1970, in the face of advances in data entry techniques, will hold 13,343 jobs in the state in 1980, a gain of only 8.9%.

Connecticut Work Force

In Connecticut, where roughly 25% of this region's work force is employed, computer specialists will hold 6,950 jobs by 1980, as compared with 5,990 jobs in 1970. The gain for this category is 16%.

Computer programmers and systems analysts, which are grouped into one category by this state's labor statisticians, will hold 6,480 jobs in 1980, an increase of 15.9% over the 5,590 jobs on the books in 1970.

The keypunch operator category, which accounted for 6,140 jobs in 1970, will decline to 5,350 by 1980, for a loss of 12.9%.

The computer and peripherals equipment operators category, which accounted for 2,700 Connecticut jobs in 1970, will shoot up 40.4% by 1980 to 3,790, the report said.

Little Change in Blue Collar Jobs

The total number of blue-collar workers in New England is expected to increase by a slight 2% between 1970 and 1980, according to the report.

This, however, will not come about as a result of widespread computerized process control in the region's manufacturing plants, but rather because of the decline in manufacturing in the region.

Blue-collar jobs in this region will decline from 36% of all occupations in 1970 to 33% by 1980, compared with the national level where such employment is expected to grow 14%.

Service industry workers appear to be the only people expected to come through the decade unaffected by automation, the report indicated.

Although the number of service workers should increase by almost 3 million in the U.S. by 1980, growing 31 percentage points, regional growth will be somewhat more modest, where a 12% gain was forecasted.

"By its very nature, the service industry should not experience any marked decline in employment due to future technological changes."

Practice of Defensive DP Seen

(Continued from Page 1)

the installation designed to do? What are the cost factors involved? What are the industrywide practices?

Standards are now being formulated to apply to the Privacy Act of 1974; users must make sure they can live with these standards because it seems virtually certain they will be carried over to apply to the private sector, Winkler warned.

The Privacy Act applies only to federal agencies, but the Koch-Goldwater bill now pending in Congress would extend these principles to private industry. As long as this bill retains its current number of H.R. 1984 and deals with individual privacy, it will be passed as a politically expedient measure, Winkler told attendees of the symposium sponsored by the Institute of Electrical and Electronic Engineers and the Association for Computing Machinery.

In the data security area, the potential liability of a user may hinge substantially on the existence of a known danger and a known solution, Winkler said.

The best defense of the computer communications professional is to be aware of the most significant reports on data security and to be able to justify any deviations from "generally recommended or available security measures," he said.

The party who asserts technological infeasibility will bear the burden of proving it, Winkler warned, adding that, in general, courts are "loath to become involved in questions involving complicated technological issues."

Laws to Alter Equipment Choices

QUEBEC CITY – New legislation covering privacy and security will alter the way in which users select DP equipment and perform other functions, according to Ronald Winkler, a Washington, D.C., attorney.

As one of the first indications of how these requirements will be administered, Winkler pointed to a recent decision handed down by the U.S. Comptroller General which concerned the awarding of a facilities management contract for DP services by the Federal Energy Administration (FEA).

The FEA had awarded the contract to a vendor operating with an IBM 370/168 under OS/MVT. The FEA request for proposals (RFP) had clearly spelled out that "the system shall provide for protection of user programs, the operating system and the areas in which their code resides from read or write access by other users."

After elaborating on the importance of the protective read and write requirements, the decision said "the hardware/operating system configuration proposed . . . did not (and could not) meet the mandatory RFP security requirements set out above, in that the OS/MVT operating system on the IBM 370/168 CPU cannot protect against read access to the main memory of the CPU.

"This 'weakness' in the OS/MVT IBM 370/168 CPU configuration is well recognized in the computer industry," the decision said. "In view of FEA's clearly stated need for security and protection of sensitive information, we find FEA's relaxation of this mandatory requirement . . . to be neither prudent nor proper."

On the Inside This Week

IBM Pressing for Abandonment of Antitrust 'Gag Rule'

By a CW Staff Writer

NEW YORK – IBM last week asked the judge hearing the government's antitrust suit against it to lift an order that bars the parties from communicating with the press and public – an order which IBM has been reprimanded for violating in the past.

In a motion to Judge David N. Edelstein, the IBM attorneys said the so-called "gag rule," Pretrial Order 4, should now be abandoned, even though they had originally requested it.

The motion was based on very recent discovery and document production "that we have had both from the Department of Justice and this organization which calls itself the Computer Industry Association (CIA)," according to lead IBM attorney Thomas D. Barr.

Speaking to Edelstein in a "robing room" conference held last Wednesday, Barr said the court would find "a substantial number of documents relating to the relationship between the [CIA] and the plaintiff, the Department of Justice.

"There is no doubt," Barr continued, "that under the terms of Pretrial Order 4, which your honor makes applicable to a person in any way involved in the case or a consultant employed by either side, that the so-called CIA has been employed in that capacity by the attorneys for the Department of Justice."

In the past, however, IBM has been reprimanded by the judge for what he felt might be violations of the order.

In the first instance he had Vincent Learson, then IBM chairman, brought into the courtroom for a dressing-down on remarks Learson made to stockholders indicating there was nothing to worry about in the government's case against the firm since IBM would win.

The second case came on the opening day of the trial when Frank T. Cary, now IBM chairman, made some remarks about the case to reporters outside of the courtroom [CW, July 2]. The IBM lawyers were ordered to make sure Cary made no further statements to the press.

Finally, there has been some criticism of IBM in regard to the order since the firm widely distributed reprints from an article from its internal magazine, *Think*, about the case.

The article, which explained the IBM defense in detail and its position in the trial while glossing over the charges against it, was circulated by the firm's public relations department to members of the press in what appeared to some to be a blatant violation of the order.

With regard to the CIA, lead government attorney Raymond M. Carlson said he was not aware that any of the rigorous procedures established by the Department of Justice for hiring consultants had been followed in the case of the CIA.

"We certainly have asked the Computer Industry Association and many, many other persons in the industry for information," he added.

Appeals Court to Hear IBM Writ

(Continued from Page 1)

defense argue prejudice the case against their client.

Lest Edelstein and the government take the writ filed with the appeals court too lightly, IBM sent one of its attorneys, Paul Saunders of Cravath, Swaine and Moore, to Dayton, Ohio, on the day the action was filed with the appellate court to interview two of the government's witnesses.

Saunders conducted a joint interview with Robert S. Oelman, NCR chairman until 1974, and John J. Hangen, senior vice-president of corporate affairs for NCR. Government attorneys were not informed of the interview and so were not present.

A transcript of the proceeding was taken, however, in compliance with Edelstein's order, which was originally made at a pretrial conference May 12.

Both men were scheduled to appear in court and did take the stand last week. But before Oelman, who was next on the government witness list, could climb into the witness box, Grant Moy, the Justice Department attorney assigned to conduct the direct examination of these witnesses, rose and explained to the court that a transcript of the interview taken in Dayton had not been made available to him or his colleagues.

Moy said he has been told by IBM counsel "not to expect to receive it" because of the writ pending with the appeals court. IBM counsel advised it would not release the transcript to the government or the witnesses until the matters it brought before the appellate court are resolved, Moy added.

Edelstein noted IBM's action raised the question of whether his order would remain in effect until the appeals court rules otherwise. He suggested lead IBM attorney Thomas D. Barr could be placing himself in contempt of court by ignoring the order.

'Robing Room' Conference

Following the completion of Oelman's testimony, the court retired to the "robing room" where Edelstein heard both parties concerning the availability of the transcript from IBM's interview of the government witnesses from NCR.

Barr noted he did not wish to fail to comply with Edelstein's order if he could avoid it. "At the same time, I wish to preserve in its full aspect the substance of the matter that I have tried to place before the court of appeals," he added.

"... if I take a literal – and I emphasize 'literal' – reading of the court's order ... [then] the transcript is available in the sense that it could be turned over at some time to the court and to counsel," Barr said.

The court order places "no time factor on it," he went on. "I would concede this is a fairly slender reed, but under the circumstances I think, your honor, it is an adequate one to stand on for the present."

But, Edelstein said to Barr, "it is not only an order ... it is an order in which you participated, it is an order in which you added a proviso and it is an order to which you agreed. It is an order to which you raised no objection."

Barr finally agreed to deliver a copy of the interview transcript to the judge and has since presented a copy to the government and the witnesses as well.

Mainframer Turned Down Offer

Telefile Campaigning to Buy Xerox Base From Users

By Nancy French
Of the CW Staff

IRVINE, Calif. – Spurned in its offer to buy Xerox Corp.'s Data Systems Division's manufacturing rights, leased computer base and maintenance contracts, Telefile Computer Products, Inc. has launched a campaign to buy the Xerox lease base and all maintenance contracts directly from the users.

"They're the ones who have the most to gain," Sam V. Edens, Telefile president, said here last week.

Describing his talks with Xerox Data System's management as having produced "nothing but frustration and dismay," Edens said "I seriously question Xerox's intent with regard to supporting their users as they have stated in the press."

Telefile has offered to pay users "top dollar" or accept for trade-in all Xerox CPUs currently on lease and being maintained by Xerox, the firm said.

When the Xerox lease expires, Telefile said it will return the user's core memory and peripherals to Xerox and replace them with new Telefile core memory and peripherals.

Telefile will pay "up to 55% of the original purchase price for Xerox Sigma 3 and Sigma 5 CPUs, up to 66% for Sigma 6 CPUs, up to 77% for Sigma 7s and up to 88% for Sigma 8s and 9s," Edens said.

Telefile also will pay up to 60% for Xerox 530s and 73% for Xerox 550s and 560s, he added.

The company will also consider trade-ins and lease-backs of purchased CPUs and those currently on installment purchase contracts, he added.

Telefile already has picked up at least one new Sigma 6 user – the University of Wisconsin at Green Bay, Edens said.

Telefile will guarantee spare parts and total systems maintenance for at least 15 years for Xerox computer systems configured with all Telefile main memory and peripherals, he said.

Telefile offers or soon will offer maintenance in 20 cities, including Atlanta; Birmingham, Ala.; Boston; Chicago; Columbus, Mo.; Dallas; Detroit; Green Bay; Houston; Indianapolis; Irvine, Calif.; Memphis, Tenn.; New York; Philadelphia; Richmond, Va.; Rochester, N.Y.; St. Louis; San Jose, Calif.; Tulsa, Okla.; and Washington, D.C.

The offer is good until Dec. 31 "but actual transfer of title can become effective when the individual leases expire," Edens said.

University First to Make Sigma Lease-Back Deal

GREEN BAY, Wis. – The University of Wisconsin here is the first Xerox computer user to turn over its system to Telefile Computer Products, Inc., which replaced all Xerox peripherals and main memory with Telefile gear and leased the system back at nearly the same monthly cost.

For an additional expenditure of 1 cent on the rental dollar, the university's Sigma 6 system has 50% more core, twice as many communications ports and an additional I/O processor, according to Edward Glaaser, director of computer service.

During the course of the seven-year combination lease/installment purchase plan, the computer system will be maintained by Telefile.

The deal was initiated before rather than after Xerox announced it was leaving the computer mainframe business, but Glaaser's arrangement with Telefile has drawn "all kinds of compliments from higher-ups for my extreme foresight, which of course I didn't have," he remarked.

According to Glaaser, the Sigma 6 system, installed in March, 1973 to replace an IBM 1130, became overloaded within a year.

"In mid-1974 it was apparent our response time could be improved with more core," he said. "We also needed additional disk storage and another I/O processor.

"But in the present-day public university world, money is very hard to come by," he said, "and my efforts to obtain funds for these changes through normal budget channels were unsuccessful."

In late 1974, Telefile President Sam V. Edens offered to lease Glaaser the equipment he needed, but Glaaser couldn't afford to buy or even lease anything extra.

"Half joking, I suggested that Telefile pay off my Xerox lease and then lease the same system, upgraded with Telefile gear, back to me for the same price I was paying," he said.

Much to Glaaser's surprise, Edens agreed to take him up on the idea a few months later, he said.

Then the Xerox decision to leave the mainframe business was announced, and it was an even better idea, he said.

"We had some difficulty with the state bureaucracy which had never heard of refinancing a computer," he said, "but we worked our way through that and, lo and behold, we have a seven-year contract at only $106/mo more than the system I was leasing from Xerox."

After the first two years, that additional amount will drop to $6/mo more, he explained.

System More Powerful

"The system we have now is faster and considerably more powerful and flexible than the previous version," Glaaser said. "We had absolutely no reprogramming to do and we are now assured of being able to get good maintenance and system enhancements in the years to come."

The updated system contains only the basic Xerox Sigma 6 CPU. Telefile is providing all 96K words of core memory plus such peripheral devices as four 45M-byte dual-density disk drives, a 400 card/min card reader, a 600 line/min buffered line printer and associated controllers and communications gear.

The system is used for both administrative and academic purposes at the 4,000-student, five-year-old university, he said.

"We are using the Extended Data Management System to maintain a full student data base, a personnel data base and a library acquisition and cataloging system similar to the well-known Ohio College Library System," he explained.

"Our library has one terminal on-line to access that data base," he said.

"While all this is going on, we run the normal mix of batch programs consisting of student and faculty research packages as well as administrative packages," he said.

Xerox, Honeywell Ink Pact for Maintenance

(Continued from Page 1)

puter equipment.

As it now stands, Xerox will continue to own its computer assets and Honeywell will make no cash payments to Xerox other than for shared revenue and for Xerox equipment parts needed for maintenance.

Honeywell said the proposed transaction will increase its revenues and earnings and, at the same time, provide an opportunity to add to its customer base and to offer needed service to a broad segment of computer users.

Xerox said the proposed arrangement will fulfill its obligation to its computer customers for service and support and allow for "an orderly transition of that business to an established company in the industry."

A Xerox spokesman said the transaction will not affect the $84.4 million after-tax write-off Xerox took in the quarter ended June 30 for expenses connected with its withdrawal from computer mainframe operations.

The proposed arrangement does not include manufacture and sale of disk drives, serial printers and terminals produced by Diablo Systems, Inc., a Xerox subsidiary, or Xerox's high-speed non-impact xerographic printers for DP systems. The operations of Xerox Computer Services are also not included in the agreement, the statement said.

IMS Problem Solving No Longer Job for 'Bitpickers'

(Continued from Page 1)

it, Maday said.

Poor IMS performance "always showed itself as poor response time," he said, and as long as response time was good, "any other problem with IMS was chalked up as a necessary expense for having a state-of-the-art system."

When response time was bad, he went on, systems programmers dug into all the notes and reports they had collected, sorted them in their idea of return-on-investment possibilities and implemented them. When they struck gold, "the pressure was off and they waited for the next response-time crisis."

Gold Miner Technique

"My data base administrator friends in Detroit affectionately call this the 'gold miner' technique . . . Nobody asks the successful gold miner how many empty shovels he had. They are only concerned with the number of bags of gold he brought back," Maday quipped.

As "the supposed manager of these efforts," however, he began to ask himself if there wasn't a better way to control IMS tuning. And yet "the gold miners were apparently successful – why rock the boat?" he asked, mixing his metaphors.

Reviewing the growth of IMS usage at his installation over several distinct time frames, he noted tuning often seemed to trigger even heavier use of the system and eventually "the world started to move faster than the gold miners."

Growth demanded organization of the tuning because, although user satisfaction was high, costs "were no longer unnoticed."

Finally, he said, "the gold miners have disappeared" and management planning and control will continue to be mandatory. Now, instead of "not bothering" management as in the old days, "it is our intention that there be real management influence in every aspect of IMS."

Six-Step Strategy

Maday's IMS performance improvement strategy can be described in six steps, he explained. The first is to develop a basic understanding of the system and the environment in which it operates.

"We can look at hardware and software until we've blue in the face, but the basic component of everything we do with IMS – or do to it – are the people.

"The real needs of your users or customers have to be understood. Filling human needs is the reason for all DP endeavors," he said, adding "IMS problems are community problems" and "it is mandatory that your technical staff be aware many external changes needed to improve performance will probably be accomplished through traditional political activity."

Establishing a data base/data communications administration function with full executive support will tend to reduce if not eliminate this political activity, he ventured, so that improvements can be based on facts.

But the facts had better include a solid understanding of how IMS works, he cautioned, so improvements can come through use of options already available rather than tinkering with IBM's code.

Step two of Maday's plan is to gain a detailed analysis of the complete IMS environment. Find out if any users have established any performance objectives concerning IMS, he urged, and find out especially if there are potential conflicts between any of these perceived objectives.

Utilize whatever measurements are already being taken of the system performance, he went on, but "don't make a big deal about using someone else's data. You'd be surprised at how protective some groups will be with 'their' data."

Anyone with a substantial IMS involvement should be associated with a major IBM/IMS user group, he volunteered. "Consider user groups a loop process – you give, you take, you give, etc."

Define Guesses

Under step three of the formalized tuning effort, specific theories or guesses about performance problems should be defined. These definitions "must be meaty" and not vague, he said, commenting this is the step most often skipped in any performance improvement effort.

"Look into your 'trick bag' to see if you have a way of measuring any of the specific theories," he went on. "If the right tool isn't available, go on to another, more easily measured theory."

Step four consists of time to attempt to analyze the real cost/benefit effectiveness of any modification made in an attempt to improve performance.

"These are not always very large-scale decisions, but all should be treated with the same vigor," Maday noted. The widest possible consideration of possible risks should be part of this cost/benefit review, he said.

Step five is the time the systems programmer gets the go-ahead and when he should spend even more time and collect more data before making any change.

Management should back the programmer in this final consideration cycle with, if it seems advisable, implicit approval to do something different than originally planned.

Step six is a final evaluation of what has been done and leads back to consideration of what might usefully be done next to improve the performance even more.

In any case, "document your successes and your failures," Maday recommended, since review of what went right or wrong "may encourage good new directions and halt useless efforts."

Correction

The sponsor of the recent meeting in San Francisco at which two University of Michigan representatives described their techniques for evaluating the Amdahl 470V/6 [CW, Oct. 15] was the Computer Measurement Group.

Psychological Factors Aid Rise in ACM Membership

(Continued from Page 1)

significantly, such as the number of pages in the journals and lecturers to chapters, support at headquarters and a new journal" have also helped to attract new members, she said.

"There is a negative side," Sammet said. "We have not grown anywhere near as fast as the industry is growing and student membership still has not grown."

Student membership is a major concern because "students are very important for the long-range health and growth" of a society, she said.

"We don't understand why more students don't join," she puzzled. "It is probably the biggest bargain they will ever receive." Students pay $11 in yearly dues while regular members pay $35.

Referring to ACM's membership not keeping up with the industry's growth rate, "I wouldn't expect ACM to grow as fast as the industry," Sammet said. But, she still feels the organization should be increasing its rolls faster than it is.

A large part of the growth in the industry is in the area of applications programming and ACM is not doing many things in that area, she said. This is a partial explanation of why ACM has not grown as fast as it possibly could, she added.

Last year's report of the LRPC, of which Sammet was chairwoman, addressed that issue when it stated that "ACM should be doing more for practitioners of DP" [CW, Nov. 20].

When asked whether ACM had done more for practitioners since the report was made, Sammet answered "not really." This is partially the fault of those who say ACM should be doing more, she complained.

"The people who say we should publish more articles for practitioners haven't written anything for us to publish," she said.

"The academic and research people have a tradition of publishing and their advancement depends on publishing," which isn't so of practitioners, she noted.

"In some cases, it could be to a company's disadvantage to publish some of its discoveries" for fear of helping out its competitors, she added.

One of ACM's strengths, however, is that it can create a dialogue between researchers and practitioners and can get researchers' results to practitioners, she said.

The LRPC also proposed starting a publication devoted strictly to business DPers. As an alternative, ACM has been actively working on a revision of its current research journal, *Communications of the ACM*, making it one "that contains ACM news and information but also contains technical material that is more interesting to people," Sammet said.

For 1976, one of ACM's projects will be a self-assessment program for members, which Sammet described as "one of the most exciting concepts that I have come across in many years."

The first tests will be published in *Communications* in mid-76 for a trial run and, if they are successful, the program could "in the very long run be one of the most important activities that ACM has ever undertaken."

The basic concept of self-assessment is that a test covering knowledge in a particular technical area is made available to an individual who wants to find out how much he knows about a partiritar topic, both in an absolute sense and in comparison with his peers.

The purpose of the self-assessment tests is "self-education, not grading or certification," Sammet emphasized. "We will still need certification," she said, but stated she does not support the concept of licensing.

However, ACM should be involved as much as it can be in the implementation of any legislation dealing with licensing, she said.

ACM is forbidden by its tax status to lobby, she said, but it is required as an educational, technical and scientific society "to operate in the public good.

"ACM does a number of things for the public," she said, mentioning it has a "responsibility to publish material which is of benefit to society and advance the state of the art. It also serves an educational purpose, such as holding conferences of all kinds."

CMU Pair Share Turing Award

MINNEAPOLIS – Two professors at Carnegie-Mellon University (CMU) have been named corecipients of the 1975 A.M. Turing Award by the Association for Computing Machinery (ACM) for their technical contributions to the advancement of the computer arts and sciences.

Allen Newell and Herbert A. Simon were cited for their joint scientific efforts extending over 20 years which ha ve resulted in contributions to artificial intelligence, the psychology of human cognition and list processing, a widely used data structure in computer science.

The Turing Award, which carries an honorarium of $1,000, was given at the opening session of the 1975 ACM Annual Conference here this week.

In psychology, an ACM statement noted, Newell and Simon were the principal instigators of the idea that human cognition can be described in terms of a symbol system. They have been able to simulate the working of human short-term memory and human problem solving in tasks such as playing chess.

Newell has been a university professor at CMU, where he received his Ph.D., since 1961. Simon is the R.K. Mellon Professor of computer science and psychology at CMU.

The award was established in 1966 in honor of A.M. Turing, whose paper, "On the Computable Numbers," appeared in 1936. He gave his name to the concept of nontrivial automata, the Turing Machine, and pioneered much of the theory that shaped programming and computer design.

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Two Years After Firm Left Mart

Users Still Don't Regret Choice of Memorex Machines

By Patrick Ward
Of the CW Staff

Two years after Memorex Corp. left the mainframe business, two users who still run MRX/30 shops said they don't regret their choice of machines.

For instance, the MRX/50 at Danneman Fabrics in Dover, Del., does jobs in three minutes that took 90 minutes on an IBM System/3 Model 10, Petrus Koot, DP manager, said.

The 64K MRX/50 performs like a 360/50 or 370/145 and has not caused him a single hardware problem in two years, Koot said.

The MRX/50 at Computer Utilities of Wisconsin is an "infinitely better machine" than the IBM 360/20 it replaced, according to President Bob Bartfeld. The Memorex machine's speed and throughput "just don't compare" with what the 360 could muster, he said.

Memorex began deliveries of its MRX/40 and MRX/50 CPUs in early 1973. The machines had been aimed at the 360/20 replacement market and offered 360/20 emulation, a DOS-like operating system and compatibility with IBM peripherals.

However, the MRX/40 and 50 had the appeal of advanced technology such as multiprocessor architecture and MOS memory, which led to 800-nsec cycle times on the MRX/50.

By mid-1973, Memorex decided it could not continue to take the losses from the mainframe venture and went back to concentrating on the peripherals business.

It promised hardware support to purchases and to lessors until the end of their lease periods. No other vendor came in to pick up the customer base.

Takes a Gamble

Danneman Fabrics had expressed interest in renting an MRX/50 just before the Memorex mainframe venture went under, Koot recalled.

After the announcement, Memorex offered to sell a 64K MRX/50 with console, 1,200 line/min printer, card reader/punch, card reader and four 29M-byte disks for $65,000, he said. Memorex promised hardware support as long as it had a field service organization.

"We had to do soul-searching in that we realized we wouldn't get any software support and that the hardware support would be different than anticipated. But we still felt, for the price we were paying . . . and the capabilities of the system, it was worthwhile taking the gamble," Koot said.

That MRX/50 has since more than paid for itself, he said.

Conversion from the shop's System/3 to the MRX/50 went smoothly, he added.

"Memorex really missed the boat because they went after the Model 20 market when they should have gone after the System/3 market," he said.

Memorex had apparently felt conversion from the System/3 would be too difficult, but, in Danneman's case, a Memorex engineer wrote a small microprogram that easily converted the System/3 files to the MRX/50's disk organization.

Once the shop switched over, it found "a world of difference."

The 800-nsec access times on the MRX/50 compared with a 2.5M-sec figure on the System/3, he said, and this showed up in throughput.

"I had written inventory programs in ANS Subset 3 Cobol that ran about 90 minutes on the System/3," Koot said. The same programs run on the MRX/50 in under three minutes, he said.

Similarly, RPG runs that took six hours on the System/3 take less than 40 minutes in Cobol on the Memorex.

The only fault with the MRX/50 software is the RPG compiler, "which is very flaky, to say the least," Koot said. "The Cobol compiler is a low level D but it has some enhancements IBM doesn't have under DOS today," Koot said.

Danneman is a 13-store retail outlet, and its DP department handles batch inventory and accounting applications. It also does outside service for small companies around Dover.

Koot plans to go to teleprocessing at the end of the year. "There is a teleprocessing monitor available, but we will probably write our own," he said.

More Careful

Working without vendor software support has made the Danneman staff "more careful when they do make patches," Koot said. "They know they can't go back to anybody in Memorex and say, 'OK boys, bail me out.' "

While Koot is happy with his $1,420/mo maintenance service, he bought a second MRX/50 system for back-up protection.

"If the first one did break down, the nearest backup would be in Baltimore, a 2-1/2 hour drive away," he said.

He is considering buying an MRX/40 system for spare parts. Used systems are selling for about $3,500 now, he said.

"We hope to get 10 to 15 years" out of the MRX/50s, Koot said. When the shop does finally convert to another mainframe, he plans to get around the problem of incompatible disk formats by bringing in tape drives and doing a disk-to-tape dump. The standard-format tape files would then make conversion easier, he said.

Like Danneman Fabrics, Computer Utilities of Wisconsin bought an MRX/50 shortly after Memorex left the mainframe business.

"We looked into it, liked the features and decided to go ahead anyway," said Bartfeld of the Milwaukee-based service bureau.

Conversion was not particularly difficult. "We were under no particular time pressure" and could run the 360/20 programs in emulation mode, he said.

In coping with the lack of vendor software support, "We just made do with what we had on the system, Bartfeld said. "We have not run into a problem which we could not solve."

The MRX/50 is the only mainframe at the service bureau whose jobs run the gamut of business DP, Bartfeld noted.

Ex-Customers More Cautious

Former Memorex Corp. computer users share a liking for third-party IBM machines and a cautious attitude toward brand-new hardware.

Interviews with three ex-Memorex users who were included in a survey [CW, Aug. 1, 1973] when their vendor exited the mainframe scene in the summer of 1973 led to these conclusions.

The users did not seem to harbor any bitterness toward Memorex, perhaps because they were all renting or testing the machines at the time of the company's announcement.

"I use their products whenever I can," according to Paul Bultmeyer, vice-president of Educational Reading Service, Inc. (ERS) in Mahwah, N.J. The shop replaced an IBM 360/20 with an MRX/40 in early 1973 and then converted back to the 360/30.

Memorex would not collect rent on their machine while it was running parallel with another, Bultmeyer recalled, so the MRX/40 served as a bridge between the shop's 360/20 and 360/30.

If ERS had gone directly from the 360/20 to the 360/30, it would have had to pay overlapping rent charges, Bultmeyer observed.

ERS had trouble with some of the MRX/40's peripherals and the software was "not what it would have been if Memorex had stayed in business," he said.

Bugs in the Compiler

Software bugs, particularly in the RPG compiler, plagued Everlon Fabrics of Closter, N.J., during the time the company tested a Memorex machine. "We all felt the hardware was good, but we felt they didn't have the software ability IBM has," Milton Mayer, DP manager, said.

"I think I would have enjoyed" the Memorex CPU; "they had such a good operating system," said Tom Justice, the DP manager at Wheel Horse Products in South Bend, Ind. "It really had a few advantages."

In retrospect, though "I would certainly look at a company's financial outlook before making a major commitment to its products," he remarked.

Mayer echoed that view: "I would closely examine something new and maybe give it a little trial period out in the field."

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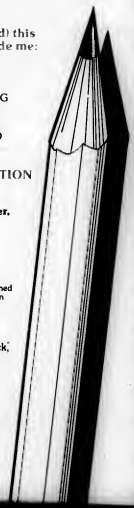

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Toronto Boroughs Nix All Moves Toward Consolidation

By Catherine Arnat
Of the CW Staff

TORONTO – Fearful of losing their autonomy, the six boroughs of metropolitan Toronto have refused to consider any moves toward consolidation of computer operations.

The Metro Executive Committee last month turned down by a vote of 21 to 10 a proposal to conduct a study on the feasibility of merging the boroughs' computer operations – a move which, it was estimated, would have saved $2.5 million.

Albert Orsava, the director of Metro Toronto's computer operation and the person who proposed the merger and the study, said the boroughs "have a few legitimate reasons for opposing consolidation, but in this day and age they are not very professional ones."

"A lot of people were scared skinny that their autonomy would be taken away," Mayor Willis Blair of the borough of East York said. "We want to keep our ability to get things done when we want them done."

Orsava said the boroughs fear a lack of services if DP operations are merged. "It's difficult to convince them otherwise. I'm quite positive we could have overcome these problems, but I wasn't given a chance to convince them," he said.

Orsava feels the committee members are not well-educated in the area of computers: "People don't really understand computers," he said. "I think they even fear computers."

Blair agreed, saying "I would be surprised if 25% of the area politicians really understand computers, which is part of the problem."

Very Little Cooperation

Presently about 15 computers are operated by the boroughs and there is "very little if any cooperation between them," Orsava said.

Although all the boroughs must follow the same regulations and union rules when doing payrolls, for example, they all have separate payroll systems, he noted.

There would be some problems in conversion, Orsava admitted, particularly in the selection of a central computer. Currently two boroughs have purchased equipment, while the rest lease or partially lease.

There are three main vendors involved – IBM, Honeywell and Univac, he said.

Orsava had hoped to start consolidation efforts by establishing three subcenters – one for each vendor – which he thinks would have taken a year.

"We then would have gone to competitive bidding to choose one central computer," he said, estimating the move to one center would take another year.

The cost of the study on consolidation would have been $30,000, which could quickly be recouped in the savings generated by centralizing, he said.

The Canadian provincial government started in 1972 to consolidate 14 computer centers and is now down to four; "the plan is going almost on schedule and it has already saved much more than $2.5 million," Orsava noted.

Paul Cosgrove, mayor of the borough of Scarborough, was the only mayor in favor of consolidation and was disappointed that even the study was voted down.

The consolidation proposal "disturbed a few feathers," he said. "There will always be competition between the different levels of government and kingdoms to be protected."

His own borough has already adopted a proposal that calls for a study on the feasibility of voluntary consolidation of the various types of applications being run, such as payrolls and public utility billings.

While Cosgrove does not think the other communities will investigate such options at this time, he does believe "politicians will change in the future.

"The public is impatient with politicians and bureaucrats that won't cooperate in the areas where they can save the taxpayers money," he said.

'Red Herring'

The borough of Egobicoke is "vehemently opposed" to both the study and any plans of consolidation, according to Deen Patterson, executive assistant to that community's mayor.

"Consolidation is only a savings in theory, not in practice," Patterson said. Referring to the provincial government's efforts, he said that although costs decreased, "the service went completely down."

The issue of autonomy is only a "red herring," Patterson said. "Consolidation won't ever be economically feasible, as far as we're concerned," he said.

A large operation is always more expensive than a small shop, he added – "if it were possible to save money through centralization we would support it."

Newspaper Team Gets DP Assist In Probe of District Attorney

By Toni Wiseman
Of the CW Staff

BOSTON – Members of the *Boston Globe*'s investigative "Spotlight" team used a computer to assist it in its latest probe, this one into the performance of Norfolk County's district attorney.

The team found George C. Burke, who recently resigned from the district attorney post, prosecuted crimes in his county not only less successfully than other Massachusetts district attorneys, but also more expensively.

Using the newspaper's Texas Instruments Silent 735 and Computer Science Corp.'s SPSS statistical package, the *Globe* team analyzed information on crime charges, trial outcomes, bail, sentences, fines and pertinent dates for more than 2,000 cases.

The data was extracted from docket books and other court papers.

To compare Burke's performance with that of other district attorneys', the Spotlight team conducted similar survey work in other parts of the state, according to a report in the *Globe*.

Studies of equal depth were conducted for Middlesex and Plymouth counties, according to Spotlight team member Peter Cowen.

About this time, however, the team discovered that each Superior Court submits statistical information on its performance to the state Corrections Department.

"Those reports actually made any further research moot," Cowen said.

The samples culled in Norfolk, however, provided a more precise breakdown of offenses then Corrections' records could have provided. The team was able, for instance, to distinguish between sale and use offenses of drugs, he noted.

"The prosecution record in Norfolk County – disposing of cases, convicting defendents and sending criminals to jail – was markedly lower on the average than that of the other eight district attorneys," the *Globe* article stated.

The study revealed, for instance, that during Burke's eight years in office, only one gambler indicted in Norfolk County went to jail and three out of every four cases contested in Superior Court were lost.

Cowen praised the use of the computer in aiding the investigation, saying it is "the future trend in journalism."

Bank on Lab Animals Set

COLUMBUS, Ohio – Development is under way on a computerized data bank aimed at making research using laboratory animals more effective.

To be known as the Laboratory Animal Data Bank (LADB), the system is being devised by Battelle's Columbus Laboratories.

Baseline data from control animals used in laboratory research will be entered into the data bank and made accessible from computer terminals around the country. The LADB would allow researchers, using the same or similar laboratory animals to retrieve and analyze research data, a Battelle spokesman said.

Because LADB users generally will not be computer specialists, the data bank will be programmed so those not familiar with computers will be able to query the data bank with ease, he noted.

"If a user wants to search, retrieve, analyze and display or print certain data, a simple set of procedures will be available for assistance," he explained.

Editorials

Not-So-Subtle Threats

Once a person's personal, financial and other information has been collected into a credit file, the person retains little control over the information.

Up to now the privacy laws have concentrated on giving the subject access to his file so unfair or incorrect data can be amended and corrected. But a recent court ruling in New Hampshire apparently decided a person has nothing to say about what happens to the file once it exists [CW, Sept. 24].

The ruling stated that a consumer's computerized credit file can be sold and resold (even to the consumer himself) at the whim of a credit bureau or anyone else.

Despite the existence of fair credit reporting laws at the federal and state levels (New Hampshire has one), the consumer has the right only to add statements correcting false information. But nothing more.

The case in New Hampshire centered on a letter sent to 60,000 persons whose credit files had been collected by the Credit Bureau of Nashua. The letter told recipients either they could pay $7.50 to buy the original copy of their file or it would be sold to a large data bank where almost anyone could gain access to their personal information.

The threat, which alluded to the dangers of data banks to make a person buy back information about himself, was interpreted as blackmail by some.

However, the provincial New Hampshire courts said the not-so-subtle threats were unfortunate, but they constituted neither fraud nor misrepresentation, as had been claimed by the consumer Protection Division of the N.H. attorney general's office.

And the courts ruled the credit bureau could sell the files it had on local residents without the permission of the consumers involved.

The New Hampshire situation may have helped us stumble onto important defects in current privacy protection laws.

It raised questions about who owns a person's file after it has been compiled – can that person be coerced into buying back data about himself, for example, and who decides when the file should be destroyed?

It is bad enough this kind of personal data can be collected without the consumer's knowledge. Now we must find a way to give the person control over the file once it exists.

A Note on Letters

Recently we have received a rash of anonymous letters on a wide variety of subjects, so it is apparently time to restate our policy on Letters to the Editor and Reader Commentaries.

Computerworld welcomes and encourages a wide range of reader responses whether they agree or disagree with our editorial policy. After all, differences of opinion and viewpoint not only make for exciting horse races, but also for exciting reading. And we don't pretend to have all the answers.

Letters and commentaries, however, should be signed. We will withhold your name on request, but hope that most people are willing to stand by their convictions and let the world know where they stand on the diverse issues confronting the computer community.

Letters should be less than 150 words, while Reader Commentaries can run up to 1,000 words.

So, if you've got an opinion, write it down. Congratulate us or castigate our policies, but don't be neutral.

And back up your thoughts with your name.

'Couldn't You Have Worn Him Down a Little Longer?'

Letters to the Editor

IBM No Exception; All Vendors 'Conspire' to Influence RFPs

Computerworld will undoubtedly receive many shrill screams of outrage at the latest revelation of IBM's "unethical" practices, i.e., the "thwarting" of free and competitive bidding on the Hudson County, N.J., computer acquisition [CW, Oct. 8].

Actually, what CW has uncovered, at least from IBM's standpoint, is not a criminal act, but rather an example of outstanding salesmanship.

I was an IBM salesman whose territory consisted largely of tax-supported institutions and agencies at the state and local level.

After more than four years of selling (and not selling) to government accounts, one fact became crystal clear – approximately 90% of all requests for proposal (RFP) are "wired" before they ever hit the street.

It appears the IBM salesman in New Jersey did exactly what his management and even his competitors would expect of him. He sold the system and then let the county figure out how to buy it.

IBM's competitors are quick to contact the press or the district attorney when they lose out in a public sector procurement (remember Chattanooga?).

As a result, it appears to an outside observer that only IBM attempts such shenanigans. The simple truth, however, is that IBM's internal policies prohibit protesting such irregularities when IBM comes out on the short end.

One may rest assured *all* vendors "conspire" to influence RFP specifications in their favor; good salesmanship demands no less.

Houghton B. Hutcheson

Houston, Texas

Small Wonder Xerox Dropped Out

The Sept. 24 issue of *Computerworld* front-paged the possible use of data on Xerox Corp.'s departure from computer sales as evidence in the IBM vs. U.S. Department of Justice trial.

If the Xerox data is honestly presented, it will probably prove IBM is dominant – not just because it is so competent, though it is – but because the competitors are not.

A couple of years ago, a major service bureau was planning to install a brace of 370/168s. Until the 168s were operational, it needed a stand-alone time-sharing system to handle its rapidly increasing load – primarily APL and text editing. Digital Equipment Corp., Xerox and IBM were the three competitors, with Xerox offering what appeared to be a clearly superior machine at the best price.

The deliberations, which began in December, culminated in April with a letter of intent from the service bureau president to Xerox for delivery of a major time-sharing system that fall.

In the next 60 days, the decision was reversed, not so much because of IBM's actions, as the lack of action from Xerox.

A demonstration of the Los Angeles system never really came off, though it was promised a dozen times. A tape copy of the APL files, to be brought up on a system for benchmark runs, was lost for about a month. It was finally located in the mailroom on a Thursday afternoon, where it languished over the following three-day weekend. Yet the following Monday had been set as the absolute deadline for the benchmark runs.

The result should be painfully obvious to anyone who has tried to deal with a non-IBM vendor: IBM installed a 370/145 in August and Xerox lost out.

No wonder Xerox is dropping out of the computer business. No wonder IBM is so dominant.

Kent D. Kitts

San Mateo, Calif.

Price Increases Contradictory

It is interesting to note IBM has increased its prices on machines by 4% and maintenance by 9% [CW, Oct. 8].

The contradiction on this particular price increase is that IBM has indicated all IBM 370/125s, 135s, 145s, 158s and 168s are presently out of new production. This price increase, therefore, was based on used equipment and not based on new equipment. This particular price increase, therefore, must be due to an inflationary factor.

IBM's announcement of a 9% price increase in maintenance was also a contradiction because IBM claimed the 370 line of equipment was practically maintenance-free.

In summary, it appears IBM is writing price increases to its requirements for greater profits.

The justification in price increases appears to be one in which IBM is attempting to get its prices in line with future announcements of new systems of the "gap type," intermediate to the existing lines. Price announcements are coming faster from IBM than product announcements.

Timothy Allen

Summit, N.J.

White Hat Suits Grosch Better

The cynics and doomsayers are in disarray. Herb Grosch has caught the computer community napping, put on his white hat and made his first visible contribution to the readers of *Computerworld*. His description of how "To Run a Railroad" [CW, Sept. 24] was lucid and most welcome.

Perhaps someone in a position of editorial preeminence at CW will invert the order of the hats in Grosch's column logo. He might take the cue and give us a predominance of substantive information from a new light-headed point of view.

Jerry Chichester

Hartford, Conn.

Women on Top

"Sex Bias No Disgrace" says the headline over the Mooshemmer letter [CW, Oct. 1]. But it e disgrace, especially when it is encouraged by such poorly argued evidence.

Twenty years ego, women in DP were mostly keypunchers, right? Not on the scientific side – I'll come to that later. But in DP I think I'm not too far off. Ten years ago, lots of progrommers and analysts, end all kinds of operations people, were women. A few managers, but not many, right? And today the percentage of women first- and second-level managers is substantial (and climbing).

Doesn't that tell us why men outnumber women "in first place," whatever that means, Mooshammer, you knot-head? If it doesn't, let me try another gentle hint. Niels Bohr, when asked how to convince the old prestomic physics professors of the usefulness of his hypotheses, replied thet it was not possible, but that in the end everybody, even scientists, had to die. That's *not* in Bartlett, by the way!

The reason the gals don't prosper is the old men sitting on the promotion committees and in the managements above 'em. They, like Mooshemmer, think women do best et typing and making coffee – but in the end, like the German physics profs, they die off. And as they do, the level of management that women in DP are ellowed to enter increases. There will be female Al Zipfs and Jeck Joneses in another decede or two; look at Ruth Davis, Jean Sammet, Sonya Anderson.

The first two came up on the scientific side, though, and thereby gave us one source of healthy professional edvancement. In the sciences, end especially in the more esoteric ones – estrophysics, quantum chemistry – there never has been much chauvinism. At the turn of the century there were prominent women astronomers, including directors of (small) observatories. In physics, there hes been e line of Nobelists stretching from Marie Curie to Meria Mayer. So when male estronomers and nuclear physicists began using electrical and electromechenicel end relay and eerly electronic computers, they eccepted the women professionals, starting with Aunt Grace of course, quite readily. Engineers, not quite so easily – they tended to regard people with degrees in math, men or women, as inferior to men holding one of the engineering degrees. But as women began to operate room-sized differential analyzers end the ENIAC and the SSEC, and to run early university computing labs as Marjorie Herrick did at Medison, thet tendency sleckened.

It is in the business world and in the even more conservative end chauvinist world of university administration (as distinguished from research) that the male diehards still preveil. But Bohr was right: in the long run, young people and young ideas survive and old curmudgeons like the undersigned disappear.

Of course, those youngsters in turn become old and try to sit on the heads of the even younger; to peraphrase de Morgan, "... and those in turn still younger ones, and so *ad infinitum*.". So women next century may be cruel to endroids, or whatever succeeds them at the bottom of the totem pole. Oops, human chauvinism: 1 meen "whoever," don't I? Sorry, robots!

Herb Grosch

If Claims Prove True

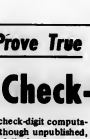
Deeds Check-Digit Method Possibly Valuable DP Tool

A report on e new check-digit computation method that, although unpublished, has been used successfully for three years in Tempe, Fle., was one of the many responses received as e result of the recent column on checking check digits [CW, Sept. 17].

If it lives up to its cleims, it will provide the only method suitable for varying length numbers anyone appears to heve heard of that catches ell single-digit errors and all adjoining-digit transpositions.

By contrast, the earlier methods discussed (and apparently all weighted-multiplication methods) fail to detect et least one set of transpositions. For instence, in the case of the Darmstedt method mentioned, any transposition between 09 end 90 would not be caught.

The Taylor Report
By
Alan Taylor, CDP



The weekness of the traditional methods lies in the use of multiplications to find the check digit. As noted in the earlier article, only e few of the 10 digits provide unambiguous single digit results.

Most, like zero, five, two, four, six end eight provide more or less embiguity, and this results in some single-digit errors or transpositions escaping detection.

The new method, developed by J.B. Deeds of Digitex, Inc. evoids this simply by not using multiplicetions, in the traditional sense et least.

Two tables can be used to find Deeds' check digits. The first, shown in Figure 1, provides for the original number to be coded into a different form having the same length as the original number.

To use the table to code a number, simply find the number in the position row (units, tens, hundreds, etc.) and the digit column of the number to be encoded. Thus, the code for 4321 is 1391, and that for 5875462 is 8882432.

Having creeted this coded form of the original number, a single-digit value corresponding to this form is found using a second table, Figure 2.

This table provides for the reduction of pairs of numbers to single digits, and successive applications of the table permit numbers of any length to be reduced to e single value.

In the Deeds method, these reductions are carried out from right to left, and the first pair is mede up of an assumed "0" after the units number.

In this way, 1391, the coded form of 4321, is first expanded to 13910 and then successively reduced to 1394, 136, 10 and then 4.

This single-digit value, corresponding to the original number, 4321, is now used to select a check digit.

The selection is done by adding zero to the right of the single-digit value and reducing this pair to the final check digit. This value being 1, the check digit for all numbers which have single-value codes of 4, as 4321 has, is 1.

Checking Method

Checking e code proceeds approximately in the same way. If e number such as 789 appears with a check digit of 2, the 789 is coded to 979, using Figure 1, giving e full number of 9792. This is then successively reduced (using Figure 2) through 978, 95 and eventually to zero as the single value. This final zero value is the check – anything else indicates an error of some sort.

The math of the method aside (they involve such esoterics es letting "*" be the multiplicetion operator on the D[0, ...9] such thet (D,*) is isomorphic to the group of symmetries of the pentagon, the potentiel importance of any improvement in check-digit science is certainly large.

Items still get posted to wrong accounts these days end, as long as this is so, eny improvements in computer science that reduce such problems must be welcomed. Whether the Deeds method is really as good es it claims to be, I still don't know, but it is certainly e new and potentially very valuable eddition to our computer armory.

Position	Units	Tens	Hundreds	Thousands	Tens of Thousands	Hundreds of Thousands	Millions	Tens of Millions	Hundreds of Millions	Billions
Digit To Be Coded										
0	0	0	0	0	0	0	0	0	0	0
1	1	4	1	4	7	4	1	4	1	4
2	2	8	5	8	4	2	9	8	5	2
3	3	6	9	6	1	6	3	6	9	6
4	4	1	4	1	8	1	4	1	4	1
5	5	8	8	5	5	5	8	5	8	5
6	6	3	3	9	2	9	2	9	3	9
7	7	2	7	3	8	7	2	9	7	8
8	8	7	2	7	6	3	7	2	6	3
9	9	6	6	7	3	2	9	5	6	7

Figure 1. The coding method described is based on the above table. To code e number, simply replace each digit in the original number with the entry cross-referenced by the original digit and the position of the digit (units, tens, etc.). The result will alweye have the same length as the number being coded. For numbers longer than 11 digits, the teble is repeated, the units column values being used as the tens of billions values, the tens as the hundreds of billions, and so on.

Left / Right	0	1	2	3	4	5	6	7	8	9
0	0	4	9	8	1	8	3	2	7	5
1	1	0	8	5	2	7	4	3	6	9
2	2	1	7	9	3	6	0	4	5	8
3	3	2	6	8	4	5	1	0	9	7
4	4	3	5	7	0	9	2	1	8	6
5	5	9	4	1	6	3	8	7	2	0
6	6	5	3	0	7	2	9	8	1	4
7	7	6	2	4	8	1	5	9	0	3
8	8	7	1	3	9	0	6	5	4	2
9	9	8	0	2	5	4	7	6	3	1

Figure 2. The reduction method described uses the above table. Reduction takes place by replacing e pair of digits with a single digit. The right-hand digit of the pair is used to indicate the row address of the replacement digit and the left hand number the column address. Thus the pair 05, when reduced, will be replaced by 5, but the pair 50 will be replaced by 8.

Failure in the Midst of Success Can Be Very Special Kind of Pain

By Miles Benson
Special to Computerworld

This is a "Project Which Failed" story – in spades.

Not only did the project fail, but the originators had their noses rubbed in it.

And it's still happening.

Fly-High Cosmocorp is one of your run-of-the-mill aerospace companies. It may be located in San Diego or Seattle or St. Louis or on Long Island, but it doesn't really matter for this story. When it's on an employment high, the surrounding area blooms like an oasis. When contracts dry up, the whole area becomes a Sahara.

The Sociology of Computing

Fly-High, like most companies that rely heavily on research and technology, places a great deal of importance on its library. It doesn't just stock it heavily with relevant textbooks and periodicals and conference proceedings and monographs; it doesn't just put it in a central, convenient location with good telephone service; it doesn't just ensure that the area is quiet, a place where a technologist can go and really think. It also optimizes the access process.

Just in Time

A lot has happened in library sciences in recent years; I don't pretend to understand most of it. But with the advent of the computer, doing a complete information search against a thorough information data base has suddenly become a very fast and feasible thing.

And just in time, too... the information explosion, especially in the technological world, is nothing short of awesome.

Fly-High was enough at the forefront of its field back in the late '60s that it knew automated library access and information retrieval were essential to its business. And although library people and computer people at first seemed like strange bedfellows, it was more than politics which caused Fly-High to get them together to begin analyzing the problem.

Fortunately for Fly-High, the library and computer people it had were both innovative and down-to-earth. They designed an access and retrieval system that was well in advance of the state of the art. They built the system, and tested it, and proved that it would work.

They put it into use in the Fly-High library. They called it Infotriev. And the users were so pleased that the implementors even wrote a paper on it and presented it at a Joint Computer Conference that year.

Remember what I said about aerospace employment, and oases, and the Sahara? If you weren't part of it, you may not remember the aerospace industry trauma of the turn of the decade which followed. But in 1969 and 1970 and even into 1971, the area around Fly-High almost blew away with the sand.

It wasn't just a little old aerospace cutback; the layoffs this time cut to the quick. People were surplused in droves; facilities were closed; office furniture was sold at auction.

Managers who hadn't done technical work in years found themselves back in the bullpen, trying to remember how to use a slide rule or a drafting table; technologists met and swapped notes in the unemployment line.

Staff Not Spared

The Infotriev staff wasn't spared. In the overall scheme of things, library science wasn't at the top of the corporate priority list – survival was. There was no immediate revenue available from information retrieval, only expenses.

The library and computer team scattered with the sand. Some landed at other aerospace companies; some went into teaching or into other library systems; a few scrunched down and weathered the storm.

In the midst of one of those aerospace layoffs, it seems like it will never end. People swear they will never work for another aerospace company. It does end of course, and some of the people return, but not all.

So it was with the Infotriev team. When the storm cleared and the aerospace skies once again grew bright, some of the information retreival folk came back. But most did not.

Classic Dilemma

And that left Fly-High with a classic dilemma. It needed a system like Infotriev because research and technology and long-term goals were just as important as they had been before. But, without key members of the team, how could Fly-High resurrect it and keep it going?

The truth of the matter was, it couldn't. Infotriev was hot off the presses when the layoffs hit. The system worked, but the documentation was never completed. Even the source code was mislaid in the layoff crunch.

It was only a matter of time before Infotriev needed a vital correction and modification. And no one could fix it.

Now comes the really painful part. It wasn't just a matter of doing without an information retrieval system. Fly-High had to have one. With Infotriev out of order, the only reasonable solution was to buy one.

And so it did. Fly-High now has a good, off-the-shelf, state-of-the-art information retrieval system, built and maintained by a major software company. The library users are pleased, and most don't know the difference.

But there are a few, just a few, of the old Infotriev team around and, when they need library services for some other project they're involved in, they wince a little in pain. It hurts to know that the fine, innovative project they built not only failed, but has been replaced by a less sophisticated competitor.

It seems a long time since they were presenting Infotriev to an excited audience at a Joint Computer Conference.

Failure is always painful. But failing in the midst of success is a special kind of pain.

Letters to the Editor

No Job for DPer

I agree with H. Richard Winkler's thesis [CW, Sept. 24] that the Internal Revenue Service (IRS) changes to the W-2 form appear largely unnecessary and very costly to industry. It is really incredible that industry sits back and does little to influence the IRS to stabilize the W-2.

But what we *don't need* is for W-2 forms to be designed by a "DP layout artist." Some of the worst designed forms I have ever seen have been developed by so-called computer/programming experts.

The W-2 should be designed, free from external or political pressures, by professional forms management personnel who are knowledgable with DP requirements. The IRS should solicit the advice and counsel of forms professionals who are members of the Business Forms Management Association.

J.W. Morris
St. Louis, Mo.

Michaelson Award Winner

Management Next CPE Concern: Bell

By Don Leavitt
Of the CW Staff

SAN FRANCISCO – The development of computer performance evaluation (CPE) has been a "grand cooperative effort" and "a lot of fun," but problems that still exist are "bigger than we are," according to Dr. Thomas E. Bell Jr., winner of this year's A.A. Michelson award.

The senior staff engineer at TRW Systems told a luncheon session of the Computer Measurement Group (CMG) – which presented the award "on behalf of the entire CPE community" – more work is needed in technical areas and in the way CPE supports and works with management.

"Any CPE effort that is able to cut a Fortran program execution time by 75% isn't tuning the darn thing. It's really debugging it," he noted. "We've got to be doing more than that."

One of the major research areas should be concerned with large data bases, Bell said.

It isn't at all surprising that various speakers at CMG technical sessions had described data bases that had grown from a billion bytes to 30 billion bytes, with every prospect of eventually growing to 300 billion bytes, he said.

"Maybe this is the way it should be, but do we really know what is happening in these situations? More understanding is certainly needed in this area," he said.

Networking data has been under study for about four years now, and much has been learned on problems such as load sharing and the like.

But there are questions, Bell said – How does this really differ from the problems in multiprogramming and multiprocessing? This, in his view, is a severe problem, especially as more and more installations move into teleprocessing mode.

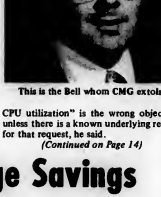
"And what about the communications between the CPU and the user?" he asked next. There is a cost – often a real cost – when the lines of communication break down. For example, Bell asked, "What happens when a remote user gets frustrated by extended response times?

"If he kicks the terminal – and that happens – can we set up a new metric relating the cost of terminal repair to the slowdown in response time?" He admitted being somewhat facetious in the specific question, but said it serves to illustrate that the user has to be considered in any real CPE work.

But the thing that pervades all other considerations – in Bell's view – has to be closer work with management.

A specific technical goal "like more CPU utilization" is the wrong objective, unless there is a known underlying reason for that request, he said.

(Continued on Page 14)



This is the Bell whom CMG extols.

State Farm Plans Reap Large Savings

By a CW Staff Writer

SAN FRANCISCO – State Farm Automobile Insurance Co. has one of the largest computer performance evaluation (CPE) staffs outside the Federal government, according to Barry Merrill, senior systems analyst.

Addressing a Computer Measurement Group technical session on how to set up such groups, he said his staff included 12 people, half of them senior level, until "we ourselves went through an evaluation study this summer. Now we have 10 people."

They are working on a massive dual IBM 370/168 installation, with 168 spindles of disk and 60 tape drives shared by the two processors.

They also oversee a 155 at the company's central site in Illinois and a wide collection of gear in 26 regional offices across the country. The 155 is used heavily in 1400 emulation, he said, but sober consideration of its workload make a rewrite of the programs a completely unreasonable alternative.

Though they haven't updated the 1401 programs on the 155, his group has been busy – and effective, he said. Recently, he plotted results they had achieved, Merrill said, and these included a 60% increase in production runs and Time-Sharing Option (TSO) sessions, with declining costs, since April 1974.

More than that, there is still capacity available and the average TSO response time has remained "just about constant." In accomplishing all this, State Farm has not had to acquire any new hardware – "on the contrary, we have released some," Merrill noted.

Place in Organization

His place in the organization at State Farm certainly has had something to do with his group's success, the analyst said.

This arrangement puts Merrill on the same management plane with the managers of TSO, system control programming and data communication, with whom he must and does work very happily.

State farm got into CPE early, starting a research effort in 1971, Merrill said. This led to a proposal for a step-by-step study of the various CPE tools and techniques then available, which was completed and accepted by May of 1972.

That proposal described what the group would consider and committed Merrill and his crew to coming to a definitive decision – for or against – each of the tools and techniques on a planned schedule. By July of that year, for example, a proposal advocating use of accounting tools was done and accepted.

Throughout the rest of that year and up to May of 1973, the group studied, proposed – and gained approval to acquire – a systems monitor, program monitor, a simulation package and a hardware monitor.

'Big Dollar' Payoffs

That amounts to a lot of CPE staff work and a lot of CPE equipment, but it has had very specific "big dollar" payoffs with real tangible, documentable situations.

In the third quarter of 1973, for example, the company's Ramac fixed-head

(Continued on Page 14)

CW at CMG

CMG Seeks Role as User Umbrella Group

By a CW Staff Writer

SAN FRANCISCO – Like a butterfly shedding its cocoon for a new kind of life, the Computer Measurement Group (CMG) earlier this month shed its old identity as the Boole & Babbage Users Group (BBUG).

The changeover – made at the group's annual conference here – is more than a cutting of ties with the vendor that originally fostered the group some five years ago.

The change is important because it emphasizes the group's desire to become a major and useful organization within the field of computer performance evaluation (CPE) President Donald R. Deese explained.

The emergent CMG wants to work closely with all other groups concerned with CPE and to provide an umbrella structure so that all the groups can work more effectively with all vendors serving this aspect of DP, Deese said.

A director at the Federal Computer Performance Evaluation and Simulation Center (Fedsim), he said CMG, as now set up and as planned, has the potential to become the largest single organization of "real practioners" of CPE work, and it will not have the sometimes awkward dependencies on any single vendor.

Deese said he hopes to have 800 members or affiliates within three years.

Cooperation With Other Groups

CMG should work with groups like the Association for Computing Machinery's (ACM) Sigmetrics and the IEEE Computer Society's software engineering unit, recognizing their right to be more theoretically oriented than CMG, Deese noted.

The kind of cooperation CMG hopes to foster is illustrated by the consultations that went on in selecting the winner of the A.A. Michaelson award.

Presenting the award, Michael Morris said he checked with the leadership of most of the other groups before he was satisfied the award to Dr. Thomas E. Bell Jr. represented the consensus on the entire CPE community and not just CMG.

Regional Groups

In addition to working with other national groups, CMG has established a mechanism to work with and encourage expansion of a growing string of locally organized, regional CPE groups that meet more frequently and, generally, with less formality than the big organizations.

Ex-president Barry Stevens of Pear, Marwick, Mitchell and Co. proposed such regional "workshops" at last year's BBUG national conference in Montreal and organized the first in New York City earlier this year.

That was to be a test operation to be evaluated at this year's national meeting. But somehow things didn't work that way, and Stevens and CMG couldn't be more pleased; a midwestern CMG is flourishing in Chicago and a southeastern

(Continued on Page 14)

Technical, Management Areas Remain Concern of CPE

(Continued from Page 13)

There is no agreement at all on the meaning of the word "performance," he noted. That being the case, "what is the right thing to ask of the system?" he asked.

Restating a concern expressed at the recent Computer Performance Evaluation Users Group meeting [CW, Oct. 8], he urged more concern for human factors that affect computer performance "almost more than all the tuning we can ever do."

This is "an expanded view of CPE," he acknowledged, but it is one that has to be followed.

Neither mainframe vendors nor CPE technicians understand billing problems completely, though almost every installation has some sort of mechanism by which it bills its customers or at least tallies how its resources were used.

But variability in billing results for the same program in different job mixes is understandably a concern to users and should be to CPE types as well, he said.

Other types of activities need to be subject to more formalized study and perhaps to the rigor of operations research methodology, he said. "It is up to us to bring reality to each new panacea offered," he said. CPE must be able to provide objective evidence – pro or con – relative to any of these claims.

There must be better agreement on who should set the objectives of a CPE effort, he said.

"We need to find out what that mission really is, Bell said. There are lots of integration problems still unsolved. But "we can solve most of them if we adopt a managerial approach, rather than demanding that managers learn our ways."

The Michaelson award, first given last year, is presented to the individual who, in the view of a screening committee, has made the most significant contribution to the advancement of computer systems measurement.

The citation accompanying Bell's plaque noted he had founded the Share Computer Measurement and Evaluation Project and led it through its first five years, developed the field of CPE through orientation and sponsorship of resolutions to "the major computer system manufacturer" and documented and developed the procedures for evaluating and measuring computer performance.

He also had guided the development of special hardware measurement devices through their design stages, adopted the classical scientific method to identify and solve computer system performance problems and incorporated classical production control techniques to the management of computer system performance, the citation said.

Super User Group Seen CMG Role

(Continued from Page 13)

regional group is becoming established in Atlanta.

An independent Measurement and Evaluation Group (MEG) set up here is now at least considering affiliation with CMG. Others in major cities "would certainly be welcome," Deese added.

An indication of CMG's determination to become a member-oriented organization lies in the newly accepted definition of member qualifications.

Anyone can be a member, according to these rules, by attending the annual national conference, contributing an article for the transactions, attending two regional workshop sessions or "if all else fails," according to Deese, by paying a membership fee.

These options are renewable annually,

CW at CMG

he noted, so that a single act of support isn't enough to keep a person on the group's lists.

Elected to two-year terms along with Deese were Linda Wright of Sun Oil (vice-president), David Morley of Boole & Babbage (secretary) and Ian K. Roome of McDonnell Douglas Automation (treasurer).

Directors elected were Dr. Thomas E. Bell Jr. of TRW Systems and David Schumacher of Lockheed Missiles and Space for two-year terms and Michael Morris, an independent consultant, and Phillip Howard, publisher of *EDP Performance Review* for one year each.

CMG's mailing address is c/o Deese, 4812 Sharon Road, Camp Springs, Md. 20031.

Planning Carefully Reaps Large Savings

(Continued from Page 13)

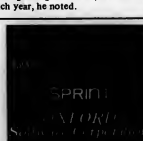
disk subsystem was replaced – "for a clear savings of $1 million."

In the second quarter of 1974, various 360/30s were replaced by Model 40s, accounting for a saving of $43,500. And, in the fourth quarter of that same year, a study recommended against the purchase of a software package to which the company was nearly committed. Savings here? $18,000.

$2 Million Savings

The company released a 370/155 early this year when a CPE study showed it wasn't needed. That saved $2 million, Merrill said, and a TSO change about the same time added $10,300 to the total of money not spent.

Changes in alternate channels and in the disk controller in the second quarter of this year have led to dropping of continuing charges of $60,500 and $5,300 each year, he noted.



Duquesne, Boole & Babbage Products Get MVS Support

By Don Leavitt
Of the CW Staff

SAN FRANCISCO – Vendors of computer performance evaluation (CPE) tools were invited to make presentations in conjunction with this year's annual Computer Measurement Group Conference and half a dozen accepted.

Two vendors used the occasion to announced enhanced versions of previously available products, and both releases are designed to provide support for "Multiple Virtual Storage (MVS)" users under IBM's OS/VS2.

CUE, DSO and QCM

Boole & Babbage, Inc. said it has added MVS support to both Configuration Utilization Evaluator (CUE) and Data Set Optimizer (DSO). Duquesne Systems, Inc. has added the support to the timing, systems performance and job accounting modules of the Quantitative Computer Management (QCM) package, a spokesman said.

CUE for MVS is said to provide the same measures of CPU, channels, devices, queuing and head movement as the "old" CUE, as well as new ENQ/DEQ and virtual storage usage measures.

The ENQ/DEQ measures will show the percentage of time a task is enqueued against any resource as well as the percentage of time other tasks are forced to wait because of this enqueue, Boole & Babbage said.

The virtual storage usage measures show paging and swapping activity and use of both virtual and real memory.

DSO shows the head movement activity between data sets on a pack and calculates a proposed reorganization of the pack to minimize such movement. A very simple repacking of critical data sets can "very often" result in a "vast improvement" of system usage, the vendor said.

For its part, Duquesne said it has extended the QCM event-driven timing approach to measure all CPU and I/O activity taking place in all MVS address spaces.

In addition to task control block (TCB) and supervisor request block (SRB) timing, QCM measures CPU time required to process I/O interrupts. It also associates that time with the address space and task that initiated the I/O interruption, Duquesne added.

The QCM/MVS includes logic enabling the installation to specify as many unique types of I/O time accumulators as the installation feels necessary.

The QCM timing module has been upgraded to support multiprocessor system problems while they are actually happening, the vendor said.

Boole & Babbage is at 850 Stewart Drive, Sunnyvale, Calif., 94086, while Duquesne is at 1511 Park Building, Pittsburgh, Pa. 15222.

CW at CMG

DPers Urged to Start 'Kidding Around' More

SAN FRANCISCO – Data processing people "are too damned adult. They just won't let the kid hang out" and that's what gets in the way of their communicating with the people they should be helping, according to the speaker at one of the Computer Measurement Group (CMG) luncheon meetings.

Utilizing the terminology of "Transactional Analysis" – which sees each person subject to three separate internal forces (child, parent and adult), Gerry Richardson of Richardson Associates said DPers are too analytical and not social enough to work effectively with others.

For example, systems analysts are "great" in developing the detailed processing steps within the systems for which they are responsible, he said. But they are "lousy" in talking to the people who should help in the design of the system and to the people who are expected to use the output once the system is in place.

The result of this narrow capability is often creation of a "green box" when a "black box" is needed, Richardson said. He admitted, however, his criticism does not apply equally to all analysts; some are well tuned to their roles.

An independent consultant who describes himself as a "catalyst" interested in attitude modification, not just behavior change, Richardson reminded his audience of the psychological games people play with each other. These are generally subconscious, but people must become aware of them because of the bad payoffs that result from them.

Detailing the workings of several of these "games," he urged the CMG members to avoid still another. "Don't go back to your organizations with the idea of catching your employees – or your boss – playing these games."

Each person must, instead, concentrate on his own attitudes. No one can make someone change his or her attitudes; that person can only do it by himself or herself. Recognizing this "ownership of feelings" can be extremely useful, he added.

Instead of being upset by someone else's attitude about a new project, Richardson said an analyst should recognize the negative attitude is "the other guy's problem."

Read All About It – But Not Yet

SAN FRANCISCO – The committee in charge of this year's annual conference of the Computer Measurement Group (CMG) has not yet received copies of all the presentations made at the 3-1/2-day meeting.

Spokesmen expect it may be another "six to eight weeks" before all the material is in and the full proceedings can be printed.

Once the documentation is ready, however, copies will be available for general distribution for $30 each, according to CMG Treasurer Ian K. Roome.

Requests should be addressed to Roome at McDonnell Douglas Automation-West, 3855 Lakewood Blvd., Long Beach, Calif. 90846.

THE TEACHER IS WEINBERG, THE SUBJECT IS YOU.

Jerry Weinberg and his associates will conduct Ethnotech's highly regarded Technical Leadership Workshop the week of Nov. 30–Dec. 5 in Tarrytown, N.Y. The entire program has been arranged under the auspices of Yourdon inc. Enrollment will be strictly limited.

THE TEACHER

Jerry Weinberg is the president of Ethnotech—the leading organization in the world today on the human factor in computer programming. He has outlined Ethnotech's principles in his book, "The Psychology of Computer Programming" and the recently published "An Introduction to General Systems Thinking."

But the written word alone does not provide an adequate picture of this approach. Ethnotech believes people can be more productive. And, that this productivity results from a delicate balance of technical, behavioral, and humanistic learning. A balance all too often ignored in ordinary computer training.

The effectiveness of this individual approach as reflected in the Technical Leadership Workshop was best put by a student who complained, "Lunch was much too long."

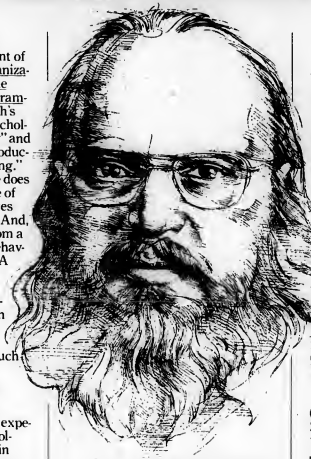
THE WORKSHOP

The Technical Leadership Workshop has grown out of the experience Jerry Weinberg and his colleagues at Ethnotech have had in over 60 person-years of consulting and training in various organizations throughout the world.

The Workshop lasts five-and-a-half-days. Classes will last each day from 9 a.m. to 1 a.m. (16 hours)—a total immersion experience for students and instructors.

The Workshop will concentrate on the technologies of open egoless cooperative programming, programming teams, structured programming, and top-down program design and development. The approach to these subjects involves each student in problem-solving activities that will ultimately have practical application.

Each day will involve: technical material; survey of literature; discussions; exercises; peer review practice; introduction strategies; and simulation gaming to teach means of overcoming resistance, avoiding pitfalls, and recognizing counter indications.



Jerry Weinberg will be joined by one or more of his Ethnotech colleagues, who include such noted instructors as Don Gause, Tom Plum, and Daniel Freedman.

THE RESULTS

In previous offerings of this course, 183 of 216 participants rated it "the best educational experience ever." In many cases, the resulting work improvement by course participants in their respective organizations has repaid the course investment many times over.

Here are some student comments on Weinberg's Technical Leadership Workshop: "a tremendous experience in introspection. Thank you." "This course has made me see the people I work with in a different light." "A fascinating course—unlike any I've ever taken—and better." "A profound educational experience."

THE SPONSOR

The entire program has been arranged under the auspices of Yourdon. We are proud of our affiliation with Jerry Weinberg and his colleagues at Ethnotech. We feel it is another example of Yourdon's philosophy of bringing you first-rate seminars taught by the finest minds in the computer industry today. In the months ahead, Jerry and his associates will be teaching a number of additional courses in conjunction with Yourdon.

THE PARTICULARS

COURSE: Technical Leadership Workshop
TEACHER: Jerry Weinberg and Ethnotech colleagues
DATES: Sun., Nov. 30 thru Fri., Dec. 5
LOCATION: Tarrytown Conference Center, Tarrytown, N.Y.
FEE: $1500

If you would like further information call Ms. Michol Beltrao (Registrar) at Yourdon inc., 212-575-0572 or fill out and send us the coupon below.

Send application to:

Yourdon inc.
Att. Michol Beltrao, Registrar
1133 Ave. of the Americas
New York, N.Y. 10036

Yes, please send an application form for the Technical Leadership Workshop.

Name _____
Company _____
Address _____
City _____ State _____ Zip _____
Phone _____

We're the people who train the people who train the people.

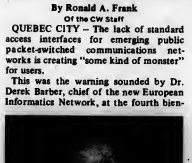
For Packet-Switched Network Users

Missing Access Interface Standards Creating 'Monster'

By Ronald A. Frank
Of the CW Staff

QUEBEC CITY – The lack of standard access interfaces for emerging public packet-switched communications networks is creating "some kind of monster" for users.

This was the warning sounded by Dr. Derek Barber, chief of the new European Informatics Network, at the fourth bien-



CW Photos by R. Frank

Derek Barber

nial Data Communications Symposium held here recently by the Institute of Electrical and Electronic Engineers (IEEE) and the Association for Computing Machinery (ACM).

Discussions on proposed standards, now under way, are absolutely crucial to users and "hardly anyone knows what is

Louis Pouzin

going on," Barber said.

An international communications maintenance organization is needed to bring some semblance of uniformity to packet-switched network methodologies, "but there is absolutely no chance of that happening," Barber told the more than 200 data communications experts attending the symposium.

Whatever standards evolve from current discussions will be set by three or four carriers and neither users nor manufacturers will have a chance to comment, according to Louis Pouzin, director of both the Cyclade packet-switching network and the Institute de Recherche

CW at Data Symposium

d'Informatique et d'Automatique in France.

The present few packet-switched networks, operated by postal authorities in Europe, are forcing users to switch to new communications jargon several times a day just to keep their equipment compatible with the networks, Pouzin said.

If these network incompatibilities continue, Pouzin warned, the user will have to go to a middleman just to perform the internetwork interfacing.

The user is most interested in using his own terminal. While this should be a simple approach, it is becoming increasingly difficult in the absence of uniform standards, he said.

'Magic Boxes'

"The only rational approach is to set international standards before we get pushed back into the dark ages of communications," he added.

What is needed is a good, simple packet-transport system that will enable users to utilize their higher level protocols on packet-switched and other transmission networks. If standards are not set, the user will have to rely on vendor's "magic box" terminal controllers to interface them to the public packet nets, Pouzin said.

Work on the necessary standards has not yet even begun within the International Standards Organization (ISO), he said. The current methods, which include an end-to-end protocol, virtual call approach, and various file transfer methods, are a "hodgepodge," he added.

Ira Cotten

Ira Cotton of the computer networking section at the National Bureau of Standards said it is "moderately urgent" to set up standards for interfacing between networks. Since the carriers are providing the packet-type services, they will have to take the initiative, he said.

(Continued on Page 18)

Battle for Access Standards Has Two Sides

By Ronald A. Frank
Of the CW Staff

QUEBEC CITY – The battle for packet-switched network standards revolves around two different access procedures now being implemented by carriers – the datagram and virtual call access methods – and users have an important stake in the outcome, according to Louis Pouzin, director of the Institute de Recherche d'Informatique et d'Automatique in France.

Pouzin is also director of France's Cyclade packet-switching network.

The way in which the packets nets are accessed is important because the European postal, telephone and telegraph authorities are determined to force data users onto these new services, Pouzin said at the fourth biennial Data Communications Symposium held here recently by the Institute of Electrical and Electronic Engineers (IEEE) and the Association for Computing Machinery (ACM).

Initially, the packet nets will be more expensive than private-line nets but, as more traffic develops, costs will drop, Pouzin predicted.

The strategy of the carriers will be to raise private-line rates, which in turn will force users onto the packet nets. Any U.S. data communications users planning to operate in Europe will therefore have a stake in the final access methods that are adopted, he said.

Complex Differences

The differences between the datagram and virtual call methods are complex. Basically, however, the datagram access to a network allows the user to just send his message; the carrier assumes responsibility for accepting the data onto the network.

In contrast, the virtual call method, also called the virtual circuit, requires error and recovery procedures by the user or carrier to break up and reassemble packets.

In the virtual call system, the user has to superimpose a monitoring method for his transmitted packets over his actual data.

(Continued on Page 18)

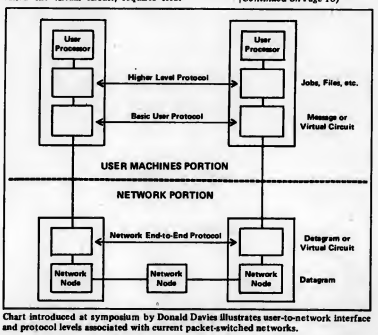


Chart introduced at symposium by Donald Davies illustrates user-to-network interface and protocol levels associated with current packet-switched networks.

Security Problems Still Plague Packet-Switched Nets

By Ronald A. Frank
Of the CW Staff

QUEBEC CITY – Despite years of development, packet-switching networks have security and other operating problems.

Recent cases have come to light where packet-switching networks have been compromised because of "malicious congestion," according to Dr. Donald Davies, superintendent of the Computer Science Division at the National Physical Laboratory in England.

In one case, a state-run betting network was deliberately congested to allow bettors to take advantage of updated odds. Satellites are very vulnerable to this type of congestion compromise, Davies told the fourth biennial Data Communications Symposium held here recently.

In order to minimize the possibility of network compromises, extensive experiments have been undertaken to simulate the characteristics of packet-switched nets run on the threshold of saturation, he said. Some of this simulation work is being done at the National Physical Laboratory.

One current operating theory is to run packet nets at a continuous level at or near saturation by introducing traffic when none is being generated by real users, he said. With more or less constant traffic loads, the behavior of s packet-switched net is more predictable.

Many of the general-purpose packet network protocols now being considered will not be appropriate for transaction-oriented traffic, Davies said. Short message traffic such as that generated by point-of-sale and banking users will have to be run using protocols which are application-dependent, he added.

The Arpa network developed by the Department of Defense is not user-oriented but communications-oriented, according to Frank Kuo of the University of Hawaii.

Hosts can't get onto a network unless they are prepared to share part of their resources.– and resources can't be shared unless there is a machanism to pay for it, Kuo said.

The Arpa net lacks this consideration. In addition, it needs privacy and security standards to protect files and guard against unauthorized access, he said.

There has to be a way for a novice to log on and get into the network resources. But once a user gets stuck in a subsystem of the Arpa net, he may not know how to escape, he said.

Often on the Arpa net packet-switched system, the user knows that trouble exists but doesn't know what to do about it. A "net trouble" message doesn't tell the user when the trouble will be fixed, Kuo noted.

A lot of hand holding is required on a system like the Arpa net. The user is much more concerned about reliability than he is about solving the virtual circuit question, Kuo said.

CW at Data Symposium

Fourth in a Series

QUEBEC CITY – The Fourth Data Communications Symposium, part of a biennial series begun in 1968, was sponsored by the Association for Computing Machinery (ACM), IEEE Computer Society and the IEEE Communications Society.

Dr. Fred Glave of Bell Northern Research was general chairman and Prof. Wesley Chu of the University of California at Los Angeles was program chairman.

Battle for Standards Centers on Methods

(Continued from Page 17)

This is more complex and costly than the datagram, Pouzin explained.

The datagram fits into existing network standards and the carrier controls the packets. This makes the transmissions transparent to the users.

The best example of the datagram approach to date is the Datapac network soon to be implemented in Canada, he said. But pressure from the PTTs in Europe has now caused the Canadians to modify their Snap protocol from a datagram to a virtual circuit concept, he said.

New protocols like IBM's Systems Network Architecture (SNA) and Digital Equipment Corp.'s Decnet have message-handling features that need a message-type interface and not a virtual call-type interface. Thus far IBM has not taken sides in the battle over datagram or virtual call methods for its SNA, Pouzin said, but has made a concession to Telenet in allowing changes to the Network Control Program macros in the 3705 front end.

This has allowed Telenet to implement a virtual circuit approach. But one drawback of the virtual circuit is that it is not adaptable to short message transaction-oriented environments found in the newer IBM terminals.

If the virtual circuit methods predominate, the user will have to develop packet-transport mechanisms that include error recovery, packet-handling methods and multiplexing among others, Pouzin warned.

The PTTs are competing with each other for multinational network traffic and, if data users insist on datagram access, they will have an easier time operating on the emerging packet-switched nets, Pouzin said. The English and French want packet nets to replace private-line networks, he said.

Lack of Standards Creating 'Monster'

(Continued from Page 17)

The carriers, however, are reluctant to set standards for equipment suppliers, he said. This type of development will have to come from the DP side rather than the communications side.

Telenet has said it will provide a CCITT standard network interface when and if such a standard is finalized, Cotton said.

Middle-level protocols dealing with the user-to-network interface remain the prime candidates for standardization.

Virtual Terminal Line Controller Has Shared-Resources Capability

PHOENIX – Courier Terminal Systems, Inc. has designed the 2761 Virtual Terminal Line Controller (VTLC) which incorporates virtual terminal addressing and virtual memory.

The VTLC front-end processor introduces shared communications resources in an IBM 360/370 telecommunications environment, the company said.

The 2761 is said to enable an IBM 360 user to have the benefits of a Vtam approach even though his 360 is a nonvirtual system. The 370 user can have a Vtam-type network without the memory constraints of Vtam.

If Vtam is used with the Courier VTLC, a dual-dimensional virtual network is established which eliminates remote communication software and some mainframe functions such as error recovery, Courier said, adding the VTLC's capability to share system resources and establish effective paths of communication provides the user with a virtual communications facility.

In the Courier VTLC environment, application programs communicate with terminals without concern for intermediate connections such as front ends, control units and communications lines.

By sharing VTLC resources, several application programs using Tcam, TSO, CICS, IMS or Vtam can communicate with different terminals on the same multipoint lines. Also, any of the terminals in a VTLC network can communicate with any mainframe application programs.

Communication line use is also shared among application programs and terminals. The terminal operator is effectively isolated from the intricacies of the network architecture, the firm said.

The VTLC supports up to four remote lines operating at speeds of up to 9,600 bit/sec and utilizing asynchronous, bisynchronous and IBM SDLC line disciplines.

Up to 32 intermixed remote, local and stand-alone terminals can be connected by log-on procedures that associate a terminal with a channel address. A line may have numerous terminals with only a subset being used at the discretion of terminal operators and the network supervisor, a Courier spokesman noted.

Using the VTLC's intelligence, control of the network is supplemented with diagnostic capabilities for testing remote lines, capturing data streams at the mainframe as well as at the terminals, analyzing software tables and collecting error statistics. Error recovery is performed by the VTLC, eliminating these procedures in the mainframe software, the firm said.

Also included are capabilities for dynamically changing the network configuration, performing message switching by logical terminal names and broadcasting to logical groups of terminals throughout the network.

In addition, a VTLC can be connected to multiple CPUs, thus expanding the overall virtual communications concept.

A minimum VTLC configuration supporting eight terminals can be purchased for $12,675 or leased for $345/mo on a three-year term. A full VTLC system capable of supporting 32 terminals is priced at $19,650 purchase or $570/mo on a three-year term.

Initial deliveries of the 2761 will begin next month, the firm said from 2202 East University Drive, 85034.

WUDS Releasing Low-Cost CRT For Data Inquiry, In-House T/S

MAHWAH, N.J. – A low-cost, interactive CRT terminal has been added by the Western Union Data Services Co. (WUDS).

Called the Video 100, the terminal can be used for data inquiry and in-house time-sharing applications.

On a one-year lease, the terminal costs $65/mo in a basic arrangement. This includes service support from Termicare, the diagnostic and maintenance service of WUDS.

The terminal has a 12-in. diagonal screen and a 64-character display set. Each character is generated by a 5 by 7 dot matrix. The standard display capacity is 24 lines of 1,920 characters each.

Data is entered at the bottom of the screen. The entire data page scrolls upward teletypewriter-style for each new line, the overflow going off the screen.

An underline cursor homes at the lower left of the screen, and the operator can adjust the brightness of the displayed characters, WUDS said.

Terminal Transactions

Keyboard control of the display is provided by Clear Screen, Carriage Return, Line Feed, Space Bar, Backspace and character correction capability. An audible tone warns the operator of approaching end of line.

Minimum of Instruction

Designed for use with a minimum of instruction, the terminal has a typewriter-type keyboard which contains 59 keys, plus a special upper/lower case shift switch, to permit generation of the full 128-character Ascii set.

While all displayable characters are seen as upper case on the screen, lower case characters may be transmitted to a remote computer, the company noted.

Switches on the left side of the keyboard enable the operator to choose between half- and full-duplex transmission mode and among 11 transmission rates ranging from 75 bit/sec to 19.2 kbit/sec. The terminal operates in asynchronous systems over both the dial-up telephone network and private lines.

The Video 100 contains the EIA standard RS-232C interface and is also available with an external, acoustic-coupled originate-only or originate-answer Bell 103-type modem.

RS-232C Connector

An RS-232C connector at the terminal's rear panel allows interfacing to teleprinters for hard-copy recording of information displayed. The bidirectional extension port may also be used to daisy chain multiple data terminals or to interface a magnetic tape cassette unit for storing large messages.

Available options include a 12-line, 960-character display; answerback capability; and lower case display.

The Video 100 is being offered on a one-year or a 90-day lease. The basic unit costs $65- or $75/mo respectively; with acoustic-coupled originate-only, it can be leased for $75- or $90/mo; with acoustic-coupled originate-answer the price is $80- or $95/mo.

First customer deliveries are scheduled to begin in January, WUDS said from 70 McKee Drive, 07430.

RCA Service Offers Receive-Only Printer

CAMDEN, N.J. – Series AF receive-only teleprinter is available on lease from the RCA Service Co.

The Extel offers five-level Baudot coding (two-speed switchable – 75- or 100 word/min and optional eight-level Ascii coding (two-speed switchable – 100- or 150 word/min).

The teleprinter needs no ribbon because it prints on pressure-sensitive paper that can make up to three copies. An optional ribbon printer is also available.

The teleprinter utilizing pressure-sensitive paper is available at $55/mo including service on a one-year lease and for $58/mo on a 90-day lease.

It is in stock for immediate delivery from RCA Service Co. Technical Services, Building 204-2, Cherry Hill Offices, 08101.

SYSTEMS&PERIPHERALS

Bits & Pieces

Comten Dynaprobe-8028 Has Event-Tracing Capability

ROCKVILLE, Md. – The Dynaprobe-8028 data handler from Comten, Inc.'s Performance Evaluation Division is a stand-alone mapping monitor with a 500-nsec event-tracing capability, according to the firm.

The device has 32 probes which can be attached to the registers or any other probe points on the host CPU. It is transparent to the computer on which it is used, Comten said.

The 8028 can gather data on instruction addresses, data set placement on disk and the location of programs in memory, Comten said.

Its built-in, front-end comparator does limit checks so the user can monitor a particular partition or anything else that has an address type of mapping.

The unit is compatible with Comten's other Dynaprobe hardware and software products. Comten offers data reduction software to process the 8028's data on most vendor's mainframes.

The 8028 is faster and less expensive than Comten's minicomputer-based 8000 series models, but cannot provide as many functions, the company said.

The 8028 costs $16,000 and leases from $640/mo depending on lease period. Deliveries will begin next month from the firm at 2 Research Court, 20850.

NMA Weighs Certification

SILVER SPRING, Md. – The National Micrographics Association's (NMA) Technicians Services Committee is mailing out a survey questionnaire and opinion poll to a sampling of its membership to determine whether there is a desire for a technician certification program.

Called "Benefits of a Certification Program," it explains to the member that the committee has been given the task to develop and recommend new NMA services for micrograghic production technicians. It also points out the purpose of such a technician certification program.

"We are striving to have top-quality micrographic output produced by highly qualified, well-trained, certified technicians whose expert production work will be more widely recognized and valued" said the committee chairman, Rodd Exelbert.

If the survey results suggest a need, the committee will proceed to establish technician categories that should be recognized and tested, create testing criteria and implement such testing with the cooperation of NMA chapters.

The NMA is at 8728 Colesville Road, 20910.

Statistics Replace Intuition

Monitor Helps Gauge Hardware Needs

By Patrick Ward
Of the CW Staff

CLEVELAND – The lack of built-in performance measurement tools in today's computers compares to "trying to fly a 747 to Europe with only an oil pressure gauge," according to Ralph C. Lantzy, vice-president and manager of systems and DP at the Central National Bank here.

When the typical DP user sees a slowdown in his production rate, his natural reaction "is to order bigger and faster equipment, which is exactly what the vendors want," Lantzy said.

Lantzy feels he has gotten around this problem at his own site by installing a $5,000 Capacity Meter from CRU, a subsidiary of Computer Resources in Cleveland.

The bank's Capacity Meter has four sensors which attach to the CPU or peripheral controllers.

Each sensor provides a direct, speedometer-type readout and an electrocardiogram-like hard copy that charts the time of day across the horizontal and the performance data on a vertical scale from 0 to 100, Lantzy said.

The performance data measures "the amount of power we are actually utilizing as opposed to its potential," Lantzy said. The meter doesn't just measure cycle time; it's that plus peripherals performance and channel utilization as they combine to make up the whole configuration," he said.

Central National has multiprogramming IBM 370/145s, each with .75M bytes of main memory. The machines, running under DOS/VS Release 30, handle on-line transaction work as well as a heavy batch load.

Improved Throughput

The Capacity Meter has been installed for four months, three of them on a test basis. "So far it has revealed excessive use of one of the disk channels," Lantzy said. "By changing the file structure and blocking factors we have reduced that channel utilization considerably and improved our throughput as a result."

The Central Bank looked at several types of hardware monitors before selecting the Capacity Meter, Lantzy said.

"What we saw was either too expensive or did not provide the extent and type of information we were looking for," he explained.

Lantzy wanted a device, like the Capacity Meter, "that gives information on what's happening at this instant with this job stream right now," as well as a historical record, he said.

One advantage of the Capacity Meter is that CRU offers a software modeling package with it, he added.

"This allows us to input variables to the model and predict the processing impact of increased volume, new production systems being scheduled and so on," he said.

'Good Scheduling Tool'

The speedometer-like direct readout of the Capacity Meter "provides some amusement," but it is also "a good scheduling tool in that it permits us to readily know what the impact of two particular jobs running together at a particular time will be," Lantzy said.

Systems programmers can also correlate the historical record on paper with the shop's job accounting system "to determine what production mix at what time caused extremes in utilization," he said.

The DP staff can use the historical data to find excessive channel utilization, excessive seek times and for fine tuning of the system generally, he said.

"We will be able to make hardware judgment on the basis of statistics, not intuition. It will also help us to spot jobs that either need retooling or rescheduling," he said.

"The saving will be in tangible dollars, not spent on peripherals or additional horsepower we don't need," he said.

Lantzy is already proud of the work his department gets out, however. The shop's two 145s share five 1403 printers. The configuration includes 16 Model 1 and four Model 11 3330 disk drives and 16 3420-equivalent tape drives. The bank also has an IBM 7700 audio response unit.

The on-line workload includes commercial loan systems and a central information file which support a total of 17 IBM 3270 CRTs.

The bank, with $2.3 billion in deposits, has about 2,000 production programs in current use.

It provides processing for about 25 correspondent banks and does payroll for about 350 corporate customers who require about 250,000 payroll checks printed each month.

Mobile Carriages Aim to Free Users From Tight Situations

FT. ATKINSON, Wis. – The mobile storage carriages from Spacesaver Corp. can provide 87% more storage capacity than conventional shelving in the same amount of space, the vendor said.

The mobile carriages were designed to be arranged side by side, with no aisle space in between. To retrieve a particular file, the user either manually or automatically pushes the cabinets apart, gets the file and then moves the cabinets back together again.

An electrical system includes sensors in the floor that automatically disconnect the system so no carriage can be moved while anyone is working in the open space between carriages.

Manual Backup

Should there be a power failure, the Spacesaver carriages can be moved manually with a ratchet, the firm noted.

The nonelectrical, manually operated models have a maximum capacity of 6,000 pounds. However, seven pounds of physical effort can move a ton of material, the vendor said.

The mobile file design provides for security by eliminating space between rows and locking all carriages together, it added.

The electric units cost $60/sq ft of carriage, plus shelving. Manual units cost about $35/ sq ft of carriage.

Spacesaver is at 1450 Jamesville Ave., 53538.

These electrically operated Spacesaver Corp. storage systems separate to leave an aisle when an operator wants to retrieve a tape volume. When that's done, the operator can press a button to bring the carriages side by side again.

Don't let this business get ahead of you.

The EDP Seminar Series will give you what you need to know.

The world of EDP is caught up in a continuous revolution. It's only 24 years since the first business computer made its appearance, and we've gone from tubes, batch processing and single-site giants to multiprogramming, time sharing, data communications, giant minicomputers and hundreds of other technological innovations that were unheard of only recently. Keeping up with this revolution is difficult, to say the least. And that's why we've created the EDP Seminar Series.
The EDP Seminar Series gives you practical applications of the newest advances in computer management. What you learn will save you time and money, because each course is geared to practical dollars and sense application.

Remember, these are seminars, not lectures, and you'll be learning by doing in a shirtsleeve atmosphere. Workshops are an important feature of the Seminars, and round table discussions and shop talk luncheons complement the seminar presentations. The workbooks and course materials are yours to keep, so you'll always have a handy reference to all you've learned.
We've selected leading experts from around the country to guide each of our Seminars. They are highly accomplished specialists in their fields, experienced in presenting their techniques to industry and management. If you're involved in one of the areas shown, you should attend the EDP Seminar Series this fall. What you learn will benefit your company, your installation, and you.

Performance Evaluation and Improvement

Saul Siimler, author of *Data Processing Systems: Their performance, evaluation, measurement, and improvement* will lead this two-day seminar on measurement techniques designed to save your installation money. As well as system performance at your own installation, topics covered include: Criteria for quantifying performance, pencil and paper analysis of a system, Benchmarking techniques, Realtime, Batch and interactive time sharing systems.
Cost for the seminar, including continental breakfasts and luncheons and all course materials is $250

Chicago	**Hyatt Regency O'Hare**	**Oct. 27-28**
San Francisco	**Dunfey's Royal Coach**	**Jan. 19-20**

How to Increase Programming Productivity

John W. Brackett, PhD, Vice President of SofTech, Inc., will lead this two-day seminar for technical managers on the state of the art of Software Engineering. Under his direction you will learn how to: create more precise and visible analysis and design; reduce integration problems; improve software reliability; incorporate visible outputs into the software development cycle; increase programmer productivity; and improve programming management methods. Topics covered include: Structured programming; Top-down analysis, design, implementation; and Chief Programmer teams.
Cost for the entire seminar, including continental breakfasts, luncheons, and all course materials is $300. Additional registrants from the same company are charged only $250.

San Francisco	**Berkeley Marriott**	**Nov. 10-11**

Data Base Design

Given in association with Leo J. Cohen and Performance Development Corporation, this three-day seminar is a package-independent examination of the techniques required for the design of effective data base systems. The seminar covers Effective Record Design, Physical Storage Techniques, Optimum File Organization/Indexing Techniques, File Integration, and much more.
Cost for the seminar, including course materials, continental breakfasts and luncheons is $350. Additional registrants from the same company qualify for a reduced rate of $300.

Denver	**Denver Hilton**	**Dec. 1-3**

Legal Tools for Computer Contracting and Protection

Under the instruction of Roy N. Freed, a nationally known lawyer, author and educator in the field of computer law, you'll learn how to increase your advantage in dealing with vendors that supply your installation. As well as practical discussion and review of your own contracts, subject areas covered in this 2½-day seminar include: Negotiations, Contracts, Warranties, Avoidance and resolution of disputes, Security, Fraud, Taxation, and Techniques for handling any transaction. Cost for the entire seminar, including continental breakfasts, luncheons and all course materials is $325. Additional registrants from the same company are charged only $275.

New York	**Summit Hotel**	**Oct. 22-24**
San Francisco	**Hyatt Regency San Francisco**	**Nov. 12-14**
Chicago	**Hyatt Regency O'Hare**	**Nov. 19-21**

Data Communications Course #1010 — Practical Data Communications Systems & Concepts

Dr. Dixon Doll, the nationally recognized teleprocessing consultant will lead this two-day seminar on the newest advances in data communications. The course covers areas like SDLC, HiD-LoD, DDS, newly approved major revisions to WATS, and the impact of Satellite Carriers.
Total Cost, including workbook, reference materials luncheons and continental breakfasts is $350. Additional registrants from the same company qualify for the reduced rate of $300.

Dallas	**Hilton Inn**	**Nov. 10-11**
Miami	**Marriott Miami Beach**	**Nov. 17-18**

Data Communications Course #1020 — Advanced Teleprocessing Systems & Design

Also led by Dr. Dixon Doll, this course is a follow-up to course #1010. Special emphasis is given to techniques that minimize operating costs in commercial data communications networks. This three-day seminar covers procedures, approaches, and algorithms for evaluating and cost-optimizing network operations. Total cost, including an extensive set of customized course materials, is $450. Additional registrants from the same company qualify for a reduced rate of $400.

Miami	**Holiday Inn Airport Lakes**	**Dec. 1-3**

How to Draft Effective Legal Agreements

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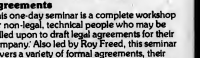

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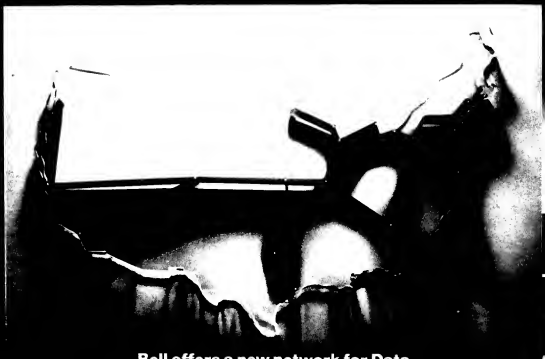
BELL IS DATA END-TO-END

Communications is Bell's business. Data communications is the fastest growing part of that business. When you come to us, we are 100% responsible for furnishing data communications, including design, research and development, supply, installation, maintenance, repair, switching and transmission. Who else takes that kind of end-to-end, total responsibility.

In these pages we spell out what our 100% commitment means for your data communications.

Bell System



Bell offers a new network for Data.

The Bell System's new Dataphone® Digital Service transmits the language of computers, digital signals. It is specifically designed to make delivery of electronic data faster, more accurate and more economical than ever before.

Dataphone Digital Service offers end-to-end, full-duplex digital transmission, at synchronous speeds of 2.4, 4.8, 9.6 and 56 kilobits per second.

By its very nature, digital transmission gives improved error-free performance, since it uses regenerative repeaters placed at intervals in the communications links to overcome attenuation. New diagnostic features isolate trouble promptly, often without the need for a visit to your premises. And that means a great reduction in downtime.

This new service can save you money in many ways. Higher speeds, fewer errors, and less downtime all yield greater throughput of data. You also save because line charges for Dataphone Digital Service are generally lower than for analog transmission. And since no modems are needed, you save that expense.

Dataphone Digital Service is available now for two-point or multi-point private line transmission linking cities coast to coast. The System will be expanded to 24 cities this year, and we hope to serve many more metropolitan areas in the near future.

BELL IS DATA

Bell offers new efficiency in verification systems

The Transaction* telephone is a Bell System response to the enormous growth and credit verification and check authorization services. It utilizes Digital Input-Voice Answerback (DIVA) to yield significant savings in time and manpower.

Sequenced instruction lights on this new terminal guide the user step by step. A magnetic stripe card sensor reads information encoded on the ABA Track II found on the back of most bank and credit cards, and the user enters additional data by means of Touch-Tone® buttons. Transmission is via the switched telephone network to Dataphone® 407B interface with the data base. Answerback is by voice through the telephone handset, or by signal lights.

The terminal can also be used as a regular telephone.

For the cardholder, the Transaction telephone means less waiting for an approval. For the merchant, bank or other user, it means greater speed and accuracy. For the data manager it means cost savings through simpler operation, reduced circuit time and greater efficiency, plus the reliability of equipment built to Bell System standards of dependability.

END-TO-END

Bell offers the Dataspeed 40 data terminal.

Dataspeed 40 service from the Bell System gives you a visual display unit, a keyboard and a line-at-a-time impact printer all in one integrated design. But since this design consists of separate modules, you can select only the capabilities you need now at each of your installations, and add others later.

The printer offers you speeds at the transmission rate of up to 5.2 lines per second in mono case, and 3.7 lines per second in upper/lower case. Lines are eighty characters wide.

The screen displays 24 lines at a time, and storage can be expanded to 2 or 3 screens of data. A variety of editing features facilitate fast and accurate message preparation.

The terminal was human engineered for maximum operator ease and minimum fatigue and error. The brightness can be adjusted to suit the operator and the location and the tube can be tilted to minimize glare.

Built-in diagnostics and test patterns use the electronics of the set to locate any difficulties.

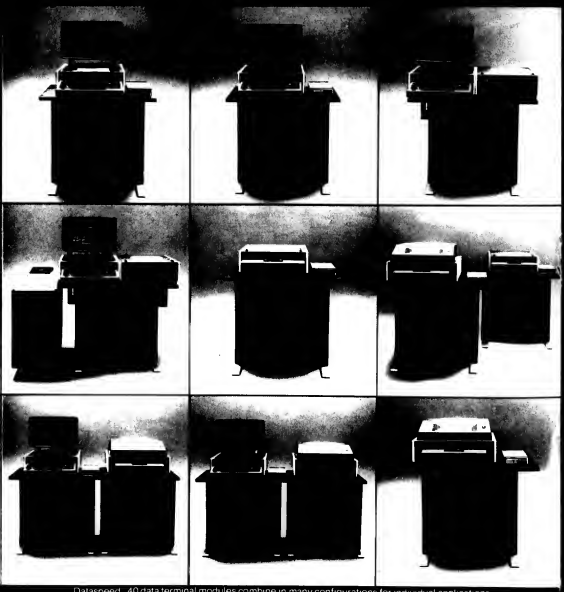
Recent additions to the Dataspeed 40 family include a tractor feed printer, and features which make the terminal more compatible with existing systems designed to support teletypewriters. These features include: destructive scrolling; a switch to select speeds of 30, 105 or 130 cps; a keyboard on-line; and split operation between keyboard/display and printer.

Those are some of the highlights of the Dataspeed 40 story. Ask your Bell Account Representative for complete literature.

Technical Specifications:

Display	5" x 11" viewing area on a 13" display tube High resolution 7 x 9-dot matrix character presentation 127 characters of ASCII code displayed (all except backspace) 1 920 character screen capacity composed of 24 lines with 80 characters per line Constant image cursor—when cursor is positioned over a character, character becomes a negative image Refresh rate: 60 frames/second
Operator Console	Standard keyboard generates 127 ASCII characters Six cursor positioning controls: Home, Return, Left, Right, Up and Down Five data editing controls: Clear, Character Insert, Character Delete, Line Insert and Line Delete Basic terminal controls: Send, Receive, Local Additional controls for all optional features
Technical Information	Speed: Serial Interface 30, 105 or 120 cps Method: Transmission is serial by bit and character with low order bit transmitted first Synchronization: Asynchronous: 1 start bit, 7 information bits, 1 stop bit, 1 parity bit Mode: half and full duplex Error control: Even vertical parity detection on received data Power requirements: 117V AC, 10%, 60 Hz

BELL S



Dataspeed 40 data terminal modules combine in many configurations for individual applications

S DATA

Bell offers a whole new family of Data Sets.

The new family of Bell System Dataphone® services answers your needs for modems. A range of models offers you nearly any transmission speed you require.

Here are the family members:

Dataphone 9600 gives you top performance at 9600 bits per second on private lines, plus multiplexing at various combinations of 2400 bps. (For instance, one 9600 bps channel, or two 4800 bps channels, or four 2400 bps channels.)

Dataphone 4800 transmits at 4800 bps over basic, unconditioned private line facilities, or over the switched network.

Dataphone 2400 operates at 2400 bps with the same choice of lines.

Dataphone 1800 operates asynchronously at 1800 bps on conditioned private lines.

Dataphone 1200 transmits asynchronously at 1200 bps over the switched network.

Dataphone 407A Touch-Tone® Receiver handles computer voice response applications, and also provides two-way voice communication when needed. It takes only half the space of our previous voice response models.

This family is thrifty. In all the new Dataphone data sets, integrated circuit design gives you fast startup and turnaround. Solid state technology saves you space. In most models, automatic equalization avoids the expense of specially conditioned lines.

In addition, built-in diagnostic features and dependable Bell System maintenance minimize costly downtime. And finally, charges for the new family save you money.

Technical Specifications:

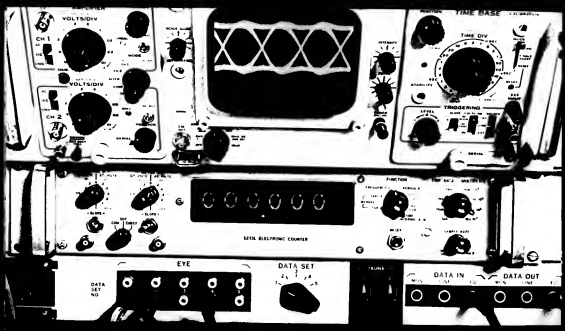
Data Rate	1200	1800	2400	4800	9600
Modulation	FSK	FSK	FSK	FSK	QAM
Operation	ASYNC	ASYNC	SYNC	SYNC	SYNC
Line Requirement	DDD	PL C2	DDD PL	DDD PL	PL
AC Power	117 Volts 10%, 60 Hz ± 5				
Dimensions					
Height	2 2	2 2	4 25	4 25	5 125
Width	5 8	5 8	10 5	16	20 5
Depth	10 8	10 8	14	11 5	13 5
Weight lbs	5 5	4 5	13	20	42

END-T

Our new Dataphone 9600 data set features many self-testing diagnostic capabilities.

The new family of Bell Dataphone® data sets offers transmission speeds from 1200 bps to 9600 bps.

O-END



Bell offers unequaled testing and maintenance.

Testing. No one else offers the depth of data communications testing service that Bell does. That's because we are responsible for designing, installing and maintaining both the transmission lines and the data sets. Today there are 52 Bell data test centers located throughout the country for testing Dataphone® services. Problems can often be solved in minutes, without the necessity for a repair person to visit the customer's premises. There are two reasons for that speed: The centers have a wide variety of new gear for remote testing. And many self-testing capabilities are built into Dataspeed® 40 and our new family of data sets. One call to the phone company is all it takes.

Maintenance. No one matches the Bell maintenance force. We have tens of thousands of craft people trained to handle normal maintenance of data service. To back them up, we have a plan called DATEC, the Data Technical Support plan. DATEC enables maintenance people to get help when they need it from all levels of the Bell System, and get it in a hurry. A really difficult problem may even be referred to the engineers at Bell Laboratories and Western Electric who designed the equipment involved. What's more, rates for Bell System services include the cost of maintenance. Nobody ever signed a maintenance contract with Bell.

Who knows more about telecommunications than the telephone company.

Bell System

County System Allocates Investment Funds

PUTNAM COUNTY, Fla. — This county is getting the most efficient return from interest-bearing time deposits, using its revenues to produce revenues, by having its computer allocate investment funds.

William Hartley, chief accountant of the county with a population of 44,000 can tell the status of the county's finances as recently as the past 24 hours, and he knows how much money to shift from savings to checking accounts to cover expenses.

"We get daily computer runs on the information we need to make the investments," Hartley said, "so we can keep less ready cash on hand and more on deposit."

The system must work with a $6.5 million operating budget, the county received about $130,000 in interest from investments last year.

Putnam County's success depends on a long chain of financial events, all of which are updated and reported by an NCR Century 101 computer.

The first step is the preparation of the preliminary tax roll required by the state government in Tallahassee for approval by July 1.

Compiled from current rolls for both real estate and personal property taxes and a computation of reassessments, the preliminary roll is a statistical projection of the county's income for the following year.

After the preliminary roll is approved, budgeting begins and, at the same time, the county prepares to send out its tax bills.

"We collect about half our taxes in November, the first month after the bills are sent out," said B.M. Noone, tax collector, "and the rest come in over a six-month period."

Information for the county's money management control is computed and reported through a series of interrelated computer programs.

The Century 101 has been in operation since January, when an NCR Century 100 system used by the county since 1970 was replaced.

The older equipment was expanded as more applications were added, but when the number of programs reached about 200, the necessity for change became evident, according to Lonnie Thompson, county DP manager.

"We were approaching the need for a second shift," Thompson said. "On a day-to-day basis, the computer was running from 7:30 a.m. to 5:00 p.m. – an hour longer than the department was open – and during July and September, which are peak times for tax billing, we were heading for a second shift."

This was at present status, without adding applications, at the time when several departments wanted to increase their use of the DP department, he said.

The new equipment was justified on cost savings alone, but a side benefit to the department was that it released two to three hours a day of computer time for programming and testing new applications.

The upgrade to a 48K processor made faster computing possible, and peripherals were also installed to speed up input and output times. Two NCR 656 disk drives, which will store up to 20 million bytes of information for random recall and processing, were also purchased at the same time.

Most of the county's data files are resident on tape, Thompson noted.

The files are read to disk for computation and printing and the updated file is then read back to tape, so efficient tape drives are necessary.

The county agreed to be the test site for the new NCR 634 tape drives, and installed three units. The handlers doubled the packing density on the tape, from the old system's 800 bit/in. to 1,600 bit/in. In addition, they can be switched back and forth to permit working at either density.

This is particularly advantageous to Thompson because his files were all at 800 bit/in. Now, when a file is read to disk for computation, it is read in at 800 bit/in., but the updated file is read back to tape at 1,600 bit/in.

The tape drives were also installed with the idea of expansion, instead of replacement, of the system. The drives can be modified to double the read speed.

"There's quite a bit of room for expansion just by upgrading the tape handlers and adding NCR 657 disk drives for more capacity," Thompson said.

An NCR 646 train printer completes the installation. The department was working with a drum printer which operated at 450 line/min alphanumerically and at 900 line/min numeric. The current printer is rated at 1,200 line/min.

Time/Cost Savings

The system was installed with the projection that it would boost throughput about 25%.

"We were pleasantly surprised to check the job report and find we'd increased our capacity by almost 40%," Thompson commented.

The savings in personnel costs to the county are also significant. Voter registration is one example. The voter's roll of 17,300 names is filed on tape and updated periodically. Voters are registered by name, sex, race, party preference and precinct and the list now is computer sorted to provide the supervisor of voter registration with up-to-date statistics.

The voter rolls also have other uses. As elections approach, lists are sold to candidates for campaigning, and the entire roll also is used for jury selection.

Thompson's programmers now are working on a traffic management information system for the county courts under a grant from the Government Highway Safety Commission. The system uses daily inputs of traffic citations from the Traffic Bureau and case disposition information from the courts to create a daily calendar of cases coming up within three days, an arraignment docket and a monthly statistical agency report for the state highway patrol, the county sheriff and the city police.

Thompson is also developing a new budget on the data base concept. The budget and the accounts payable system will be merged into one file.

"In the budget we have three primary areas: expenditure accounts, revenue accounts and depository accounts," Thompson said.

"Any transaction that affects an expenditure account could also affect a revenue account and always affects a depository account. So in the new system every expenditure master will have a chaining address to its corresponding revenue account and from there to the corresponding depository account. Instead of updating three files, we will now only update one and the computer will do the rest," he said.

New input devices are also being installed to speed the system even further. One is a group of off-line CRT terminals through which the departments will enter their own data on disk. The unit will edit the data for efficient input to the computer.

Another input device an NCR 275 electronic validating machine has been installed in the tax collector's office. At the same time it validates payments, the machine will also capture the data – account number and the amount of the payment – on tape cassettes.

The data then can be read directly into the computer from the cassette, eliminating the additional step now required.

An operator at the Putnam County, Fla., DP department prepares for a run on the NCR Century 101.

Form-Feed Option On Paper Shredder

NORTHBROOK, Ill. — The Jet-12 desktop paper shredder from Shredmaster Corp. can be ordered with an optional form-feed funnel attachment that allows the unit to automatically feed and shred continuous forms, the vendor said.

The device costs $645 from the firm at 1101 Skokie Blvd., 60062.

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PACK TYPE:		DRIVE TYPE:		CHARACTERISTICS:		
CDC MODEL #:	IBM MODEL #:	IBM DRIVE:	CDC DRIVE:	TPI:	BPI:	8-bit Byte capacity:
846	2315	2310	—	100	1100	1.25
846-2	—	—	—	100/200	2200	2.5/5.0
847	5440	5444	9425	100	2200	2.5
848	—	—	9427	200	2200	5.0
849	1316	2311	23111	100	1100	7.25
851	—	—	854			
869	2316	2314	23141	100	2200	29.2
871	—	—	841			
873	—	—	23142	200	2200	60.0
876 storage module	—	—	9760	200	6060	40.0
877	—	—	9762	400	6060	80.0
879	3336	3330	33301	200	4040	100.0
881	—	—	844			
882	3336-11	3330-11	33302	400	4040	200.0
883	—	—	844-41			
889	3348-35	3340	9778	300	5500	35.0
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CONTROL DATA CORPORATION

Interactive Graphics System Eases Firm's Renovations

By Patrick Ward
Of the CW Staff

ST. PAUL, Minn. – An interactive computer graphics system is helping the 3M Co.'s central engineering department produce architectural drawings in about half the time it would take to do the work manually.

The 3M Co. spends hundreds of thousands of dollars each year on construction and renovation of its own facilities. The graphics system cuts down on the repetitive nature of the necessary architectural drawings and provides quality superior to that of copiers, according to H.W. Reimer, a senior designer.

Beyond that, the system's stored memory lets it automatically draw items like light fixtures across a floor plan at the operator's order, he said.

The same capacity to call up previous data from memory allows the designer to check for interference between various elements in a floor plan long before actual construction starts, Reimer said.

The Computervision graphics system includes one Interact II Large Interactive Surface (LIS), an interactive plotter/digitizer terminal; an interactive graphics CRT display; a minicomputer with 4K memory, 256K-word disk memory and cassette tape unit; and Computervision's Cadds 1 graphics operating system software.

Multilayer Set of Drawings

The process begins when an architectural floor plan is developed to the specifications of one of 3M's manufacturing divisions. It is then input to the Computervision system by digitizing on the Interact LIS.

This building outline drawing, called the "background drawing," is the first layer of what will become a multilayer set of drawings of the building, each layer being a floor plan for a specific function such as lighting, power, heating, ventilation, air conditioning, plumbing structure and major equipment placement.

To produce one of the layers of the drawing – the electrical system layout, for example – a ball-point pen plot of the background layer is provided for the electrical system engineer assigned to the building. He sketches his electrical layout on this drawing.

Depending on the nature of the job and the preference of the engineer, this free-hand layout may be fairly detailed or it might be very rough. The electrical system engineer then returns this marked-up drawing for input to the computer graphics system.

Using a library of industry standard electrical symbols and subfigures commonly used at 3M, the designer at the interactive terminal enters the layout into the graphics data base of the system. The designer can work at either the LIS plotter/digitizer or at the CRT.

When the designer is satisfied with the new drawing, he obtains a pen plot showing all the information he has entered and returns it to the originator for checking. When the drawing gets final approval, a finished-quality ink plot is made.

In similar fashion, a set of floor plans for all functions is built up in significantly less time than would be required using manual methods. At the same time, a computerized graphics data base for each drawing is stored in the computer for later output or update.

Zeta Off-Line Plotter Includes DEC PDP-11

LAFAYETTE, Calif. – The 6000 series intelligent off-line plotting system from Zeta Research includes a Digital Equipment Corp. PDP-11 that can be used for applications outside the system.

Consisting of a magnetic tape drive, the PDP-11 and a 36-in. drum plotter, the 6000 series features a speed selector for optimum speed/quality output, Zeta said.

The plotter operates at speeds up to 4,000 increment/sec (14.4 in./sec). Increment size is .025 in. A .002-in. increment size is optional.

System controls are mounted on the front of the computer and include the following functions: START (plots, unattended, from 1 to 159 plot files); PAUSE; NEXT PLOT (stops plot at any point, advances to clean paper and begins next plot); SELECT SWITCHES; STORE; and MULTIPLE (which executes any number of multiple plots up to 159).

Other functions include SEARCH/RESET (searches, locates and plots desired file, then resets); SPEED (selects maximum speed for highest line quality); and ERASE (erases from memory the previous file which was selected and stored).

The plotting system costs $37,500 from the firm at 1043 Stuart St., 94549.

CAM-I Sets Two-Day Meet In St. Louis in January

ST. LOUIS – Computer Aided Manufacturing-International, Inc. (CAM-I) will hold a two-day coding, classification and group technology seminar here in mid-January.

Users and vendors will describe applications, problems and results. An on-line computer demonstration is planned for all seminar attendees of the CAM-I Machined Parts Process Planning Creator Module.

The cost will be $25 for CAM-I members and $250 for nonmembers.

Further details are available from C.H. Link, executive secretary and general manager of CAM-I, at Suite 1107, 611 Ryan Plaza Drive, Arlington, Texas 76012.

Syncom Box Holds Floppies

ORCHARD PARK, N.Y. – The Flexi-Disk security files from Syncom, Inc. are all-steel boxes with carrying handles and nonskid, nonscratching bases, according to the vendor.

Friction strips inside the boxes prevent floppy disks from slipping whether the boxes are full or nearly empty, the vendor said.

The FS-100 security box holds up to 100 floppies and costs $85; the FS-60 version holds up to 60 disks and costs $75.

Syncom is also offering two 20-in. mobile carts. One holds two floppy disk boxes and costs $74; a single-box cart costs $59.50.

Syncom is at 1 Syncom Place, 14127.

Mini Bits

Ampex 300M-Byte Disk Drive For OEMs, Systems Houses

REDWOOD CITY, Calif. – Ampex Corp. has announced a 300M-byte removable disk drive it will begin shipping to systems houses and OEMs early next year.

Called the DM-9300, the product is primarily intended for large minicomputer systems, an Ampex spokesman said.

Ampex achieved the 300M byte/spindle capacity by increasing the linear bit density of its 200M-byte drive from about 4,000 bit/in. to around 6,000 bit/in., a spokesman said.

The DM-9300 retains about the same number of tracks as an IBM 3330, he noted, but its data rate will increase from the 3330's 806 kbyte/sec to about 1.2M byte/sec.

Ampex's 100M-byte and 200M-byte drives are field upgradable to a DM-9300. The DM-9300 will also retain compatibility with IBM's 3336 Model 2 pack, the spokesman added.

The drive will cost about $14,500 in OEM quantities from Ampex at 401 Broadway, 94063.

Interdata Models Get Memory

FORT LAUDERDALE, Fla. – A plug-compatible core memory module for Interdata models 7/16, 7/32, 8/32, 50, 55, 70 and 74 minicomputers has been announced by Standard Memories, Inc.

Designated the 116K16MM, the module has storage capacity of 16K 16-bit words and is identical in form, fit and function to core memory offered by the mainframe manufacturer, Standard Memories said.

The 116K16MM offers access time of 275 nsec maximum. Memory cycle time is .75 μsec for the model 8/32 and 1 μsec for the 7/16 Basic, 55, 70 and 74 models.

The 7/16 HSALU and the 7/32 may have either .75 μsec or 1 μsec cycle time at the option of the CPU.

Two basic versions of the module – with and without parity – are offered. All other memory configuration requirements are accomplished with five push-on clips which fit over wire-wrap posts.

The module costs $2,100 from the firm at 2801 E. Oakland Park Blvd., Suite 307, 33306.

Crown Has Movable DP Offices

BRISTOL, Conn. – The movable DP offices from Crown, Inc. are intended for construction sites, manufacturing plants, truck depots and other places where a user might want to have a small computer system, but lacks the office space.

The offices, most of which are movable by forklift truck, come in a variety of sizes. They are delivered fully assembled, and the user has only to tie the prewired panel box into an adequate power source, Crown said.

A 10 ft by 16 ft movable building with carpeting, heating, paneling, lights and electrical supplies costs about $2,800 from the firm at 179 Cross St., 06010.

LSI I/O Circuit Cuts Floppy Costs

ANAHEIM, Calif. – Rockwell International Corp. has introduced a large-scale integration (LSI) floppy disk controller I/O circuit as part of its PPS-8 microprocessor system.

With the unit, the firm claimed costs of IBM-compatible disk controllers can be cut by as much as 80%.

Prices are $125 each for quantities of one to 24, $100 for quantities of 25 to 99 and $80 for quantities of 100 to 199 from the firm at 3310 Miraloma Ave., 92803.

Programs Rated Low

Mini Hardware Scores High in Survey

By E. Drake Lundell Jr.
Of the CW Staff

DELRAN, N.J. – Minicomputer users are generally pleased with their hardware and mini operating systems, but are less pleased with available applications programs and technical support that is available, according to a user survey.

The survey, conducted by Datapro Research Corp. here, found users rated the reliability of their mainframes as the high point for minicomputers, followed by ease of operation, reliability of peripherals, manufacturers' operating systems, ease of programming and responsiveness of maintenance service.

Receiving lower ratings from the 699-user survey (each with an average of 3.12 mini systems installed) were the technical support available, the applications programs from the mainframe vendors, the ease of conversion and the effectiveness of maintenance service.

This is because, "despite claims to the contrary, programming for minicomputers is no easier than programming for the larger, general-purpose DP systems," Datapro said.

"In fact, the minicomputers' short word lengths, limited storage capacities and lack of sophisticated software aids tend to make the programmers' job even more difficult," the firm added.

"As a result, it is common in minicomputer applications for programming costs to far exceed the cost of the hardware itself," Datapro said.

Programs Written In-House

Probably because of the lack of applications programs from the vendors, the study found 84% of the users surveyed used in-house personnel to write at least some of their programs.

Of the respondents, 14% used computer manufacturers personnel for some program development; 21% used some "ready-made" programs from the mini maker; 12% used proprietary packages; and 12% used contract programming houses for some program development work.

The figures add up to more than 100% because many users rely on more than one source for program development, Datapro noted.

In the survey, 59% of the users reported they used their systems for business DP. Data communications applications were next in line, with 24% of the users reporting such applications.

Following those applications in popularity were scientific/engineering calculations, with 19% of the users reporting some such uses; real-time control, with 19% of the respondents; and data base management, which 11% of the users reported running on their mini systems.

Again, the figures add up to over 100% because many of the users have multiple applications for mini systems.

Terminals Used by Half

Over half of the users in the survey were using terminals with their mini systems, with 91 of the 699 using batch terminals and over 300 using interactive terminals.

The independent peripherals manufacturers seemed to be fairly well entrenched with the minicomputer users with over 34% reporting the use of independent disk drives; 20% reporting installations with independent tape equipment; 9% reporting independent main memory; and 17% claiming the use of "other" types of independent peripheral equipment.

The report, which contains a listing of the key functional characteristics of 189 commercially available minicomputers from 54 separate manufacturers, is available for $10 from the firm at 1805 Underwood Blvd., 08075.

DG Nova 3 Series for OEMs Uses In-House Semiconductor Memory

SOUTHBORO, Mass. – Data General Corp. (DG) has expanded its line of OEM minis with the introduction of the Nova 3 series of machines that range in size from 4K to 128K and in price from $2,600 to $34,200 in typical configurations.

At the same time, the firm announced it is moving further along the line of vertical integration by offering Data General-manufactured semiconductor memories for the systems.

The four-slot Nova 3/4 and the 12-slot Nova 3/12 – the first members of the series – are available with core memory in 8K and 16K increments or with the Data General-produced MOS semiconductor memory in 4K, 8K or 16K increments.

The systems are said to be compatible with the firm's Nova-line software and with all Data General peripherals.

Software includes the firm's real-time operating system (RTOS) and real-time disk operating system (RDOS) along with the firm's currently offered programming languages.

The Nova 3 line will compete with computers like the Hewlett-Packard 21MX, Digital Equipment Corp.'s PDP-11/03, 11/04, 11/35 and in some cases the LSI-11, according to a company spokesman.

Besides the memory expansion capability up to 128K, the units feature a data channel map capability, high-speed direct memory access channel and 16-level priority-interrupt structure, and a choice of operator's console or turnkey front panel, the firm said.

Memory Speeds

Memory cycle speeds are 700 nsec for MOS memory, 800 nsec for 8K core memory and 1,000 nsec for 16K core. Core and semiconductor memories can be mixed in any combination in a single system, the firm noted.

The semiconductor memory consists of N-channel 4K MOS random access memory (RAM), which the firm is manufacturing at its plant in Sunnyvale, Calif.

An alternate memory board will be available using MOS parts supplied by Texas Instruments (TI). Data General said it expected a substantial number of semiconductor memories to be shipped with the TI parts.

Nova 3 semiconductor memories will be offered with an optional battery backup power supply, the firm added.

The low-end price for a Nova 3/4 with programmer console and 4K of MOS memory is $2,600, while a Nova 3/12 unit with console, parity and 32K MOS will sell for $10,800.

A full-blown system with 64K of core and 64K of MOS memory, console, expansion chassis, hardware multiply/divide, memory management unit, automatic program load and power fail/automatic restart will go for $34,200, the firm said.

Prices are discountable according to the firm's normal OEM schedule, and deliveries will begin in January, the firm added.

The firm also pointed out that, used with the firm's DCU/50 data control unit and synchronous and asynchronous multiplexers, a Nova 3/12 could handle medium- and high-speed data transmission lines.

CA Adds Floppy-Based Systems

IRVINE, Calif. – A group of floppy disk operating systems has been announced by Computer Automation's (CA) Naked Mini Division to accelerate the process of preparing applications programs.

Using essentially the same software as CA's paper tape disk operating system, these batch processing floppy disk operating systems allow command inputs from a keyboard or from job files containing job control language statements, CA said.

The operator can load the disk with a string of jobs, start up the system and then walk away. The operator does not have to sit at the machine and interact with the system, the vendor said.

Each machine contains an Alpha LSI-2 series minicomputer, a core memory with a capacity of 16K or 32K words, a dual floppy disk subsystem, a Teletype ASR-33 and an operating system package that includes an executive, an input/output control system, a disk file manager, an assembler and a macro assembler.

Utility Subroutines

The operating system Executive with its resident utility subroutines supports such program debugging and maintenance functions as file-to-file viewing/copying, character-oriented text editing, line-oriented source program editing, linking/editing object programs and alphabetizing/listing cross-references of program symbols, according to CA.

Each floppy disk operating system includes basic variables, Teletype interface, auto load, real-time clock, power fail restart and EIA RS-232 interface options as standard elements. All 32K systems include a Fortran IV package that supports the full Ansi Fortran X3.9-1966 language plus extensions, the firm said.

The advent of floppy disk drives led to the development of small programming systems without the need for large cartridge disk drives and paper tape equipment, according to Emmons Miles, general manager of the division.

Floppy disk drives give operating systems nearly the capabilities of cartridge disk drives and paper tape equipment at less cost, he said.

Although floppies operate at a lower rate of speed than cartridge disks, floppy disk operating speed usually does not degrade the total system throughput when he added, noting that since one-quarter of a megabyte of storage can maintain a fairly large library, the floppy can store an adequate number of programs.

"These advantages make floppy disk operating system a very attractive system for getting more productivity out of programmers and they don't have to sit knee deep in paper tape during program development," Miles said.

Model prices range from $13,975 to $35,550. Delivery is 30 days from the firm at 18651 Von Karman.

Also Prove Cost-Effective

Dedicated Minis Make Space Probes More Reliable

By William C. Frey
Special to Computerworld

PASADENA, Calif. – In processing data received from the National Aeronautics and Space Administration (Nasa) Deep Space Network at the Nasa/Jet Propulsion Laboratories' (JPL) Network Operations Control Center (NOCC) here, we are realizing more reliable results than previously with our large-scale computer – with improved cost-effectiveness – with a series of functionally dedicated minicomputers.

Separation of function by minicomputer holds the key. Each minicomputer performs its own dedicated task in a distributed processing network and the network of processors contains an on-line spare minicomputer, so that in the event of prime computer failure, software swapping can be performed to continue the function on the backup computer. Thus a minimum amount of system disruption occurs when a processor goes down.

The distributed processing approach to the network data processing area of NOCC is a significant departure from the prior situation, in which all network data processing resided in a single large-scale computer shared with the Nasa/JPL flight project and mission control software.

NOCC performs all the Deep Space Network data handling and processing functions for such missions as Ranger, Pioneer, Mariner and Helios. The Deep Space Network consists of a series of 10 ground tracking stations strategically located around the world for continuous tracking of space probes.

Data acquired by the 10 ground stations is transmitted by high-speed communication links to the JPL control center over 4,800 bit/sec and 50 kbit/sec communication lines.

Software Tasks

The network data processing software tasks include: monitoring and validation of data from the Deep Space Network tracking stations, logging on magnetic tape all incoming data and remotely controlling the configuration of the Deep Space Stations.

As traffic in what we call deep space (lunar distances and beyond) picked up in 1972, it became apparent general-purpose, large-scale computers simply could not give us the software flexibility and responsiveness for both flight project and mission control and network data processing operations.

We couldn't tailor or expand the software specifically for our needs because of the impact of other users of the large-scale system.

The answer lay in separating the flight project and mission control processing from the network data processing functions associated with the JPL/Nasa Deep Space Network.

At this writing, we are in the final stages of a three-phase conversion from the large-scale, general-purpose approach toward a separate facility for network control data processing, which will include 19 minicomputers, all Modcomp II units provided by Modular Computer Systems.

The three-phase conversion is designed to carry the NOCC functions from a point of full reliance on a large-scale computer to an independent minicomputer network with capabilities for DP and remote control of the 100 Deep Space tracking stations around the world.

Phase I used a single minicomputer for switching and routing of communication acquired from the tracking stations. In addition, a medium-scale computer was introduced for a limited amount of communications processing, signal validation and off-line analysis of communication network performance.

Phase II has been implemented at this writing. It involved setting up seven Modcomp II minis to implement dedicated functional processing.

Two of these minis serve as communications switchers, operating in full redundancy for continuing backup. Four of the Modcomp units are dedicated to the data stream functions of the mission: telemetry, tracking, command and monitoring. The final Modcomp system can be introduced for backup in case of failure of any of the four functionally dedicated units.

Each of the Phase II minis has 64K (16-bit) of main memory and 5 million bytes of disk storage. Each has a console printer and drives a color video status display with keyboard-entry capabilities.

Data routing within this minicomputer network is through what we call a star switch controller, a hardware assembly designed and built at JPL. This controller forms the necessary data links between the front-end communication processors and the functionally dedicated computers.

Functional Breakdown

The functional breakdown of the network processors is at the heart of the reliability and throughput we have realized. JPL people have designed and written application programs specifically for each of the data streams.

Data covering the four network functions – telemetry, tracking, command and monitoring – are intermixed in streams which move between the ground stations and NOCC. Evaluation and validation of data in each of the four streams must reflect different criteria.

In Phase III, a full complement of 19 Modcomp II minicomputers will be utilized to perform the network operations control function. More sophistication in the processing and validation of the Deep Space Network data will be introduced.

This, simply, is why it has worked well to have functionally dedicated hardware and software for processing of network data. Files within each of the functional minis contain data projecting conditions expected throughout the course of a mission. The data on anticipated results is compared continuously with the actual readings.

Frey is group supervisor for network control systems at JPL.

COMPUTER INDUSTRY

CI Notes

Univac Ends Xerox Talks

BLUE BELL, Pa. – Univac has discontinued negotiations to purchase Xerox Corp.'s Data Systems Division's customer base.

Univac said no agreement could be reached on "price, terms or conditions."

This leaves Honeywell, which has expressed interest in the Xerox user base but not the firm's manufacturing facilities or other assets, as the principal contender in negotiations.

At the same time, Xerox laid off 580 more employees, bringing to 1,200 the number idled as a result of the firm's decision to leave the mainframe business.

When that decision was announced last July, the Data Systems Division employed 4,100 throughout the U.S.

A Xerox spokesman refused to say where the new cuts were made, but sources indicated several hundred were production employees.

As for its backlog, the Xerox spokesman did say "we are working away at it," but refused to connect getting on top of its current orders for mainframes, add-on equipment and spare parts with the most recent pink slips.

Bill to Beef Up Trust Busters Awaiting Ford's Signature

WASHINGTON, D.C. – A bill that would strengthen the antitrust enforcement staff of the Justice Department has been approved by a House-Senate Conference Committee and is on President Ford's desk for signature.

The bill – H.R. 8121 – is the first ever passed that provides an appropriation for a specific division of a federal agency, a Senate Judiciary Committee staff member said.

The President has until Oct. 21 to sign the measure that would raise the antitrust division's appropriation for the current fiscal year to $21.6 million.

Controversial measures proposed to revamp the Sherman Antitrust Act, the Clayton Act, the Civil Process Act and the Federal Trade Commission Act and thus provide for more effective antitrust enforcement are due for consideration by the end of October.

MPI Sells Calif. Memory Plant

MINNEAPOLIS – Magnetic Peripherals, Inc. (MPI) has sold its computer memory products plant in Hawthorne, Calif., to Northrop Corp. for an undisclosed amount of cash.

Design and production of flexible disk drives and cartridge disk drives will be transferred to other MPI facilities in Oklahoma, South Dakota and Minnesota over the next seven months, the firm said.

The Hawthorne plant, which currently employs approximately 800 people, will phase out production staff gradually to assure continuity of customer shipments.

Prime Awards Discount to Educom

FRAMINGHAM, Mass. – Prime Computer, Inc. has signed a letter of agreement with the Interuniversity Communications Council, Inc. (Educom) offering discounts on all hardware and software products on the company's standard price list as well as on services.

A consortium of more than 200 colleges, universities and nonprofit organizations, Educom was founded to help its members make the most effective use of computer and communications technology.

Under the agreement, Prime will make sales, delivery, installation and service arrangements with each Educom purchaser directly.

But Nature of Industry Changing

DP Sales Seen Topping $25 Billion in '75

By Catherine Arnst
Of the CW Staff

HOT SPRINGS, Va. – With revenues that should top $25 billion this year, the computer industry is "alive and well," Jim Peacock, editor of *EDP Industry Report* (EDP/IR), told the Computer Industry Association's (CIA) annual meeting here recently.

At the same time Peacock shared some new EDP/IR growth figures with the 40 executives who attended, he warned the "very nature of the industry is changing," and independents should be prepared for it.

Peacock predicted general-purpose terminals will be joined by more than one million "information appliances" including such things as point-of-sale terminals, various banking terminals, stock market quotation/trading terminals, special ticketing or betting terminals and electronic funds transfer devices which will be installed by 1980.

CW at CIA

The number of data entry/data communications keyboards in the U.S. will hit the 950,000 mark this year and will top 1.5 million by the end of 1979, Peacock said.

The independent computer peripherals business will multiply its 1974 volume 2.8 times to about $6.4 billion in 1979, he predicted, and computer services will expand two and one half times to the $6.6 billion level.

Minicomputer shipments, which exceeded $1 billion in 1974, should grow three times by 1979 and reach the $3.4 billion mark, he said.

Changes in the Wind

As for changes, the first will be the "way we define and describe computers and, for that matter, in the way we go about counting them as well," he said.

"The architecture of computer systems will continue to move away from the classical combination of processor, memory, some control circuitry and an input and output module. The computer will become a network oriented around a vast memory hierarchy."

The "drastic reductions" predicted in product prices may not actually occur, will be looking for alternate upgrade paths and manufacturers will offer them.

IBM is already shifting its emphasis away from rental, he added. The 5100, for example, is a purchase-only machine.

"It's becoming clear IBM's General Systems Division represents a new voice in the computer industry that we had better be listening to," he said. "Perhaps

Standards Take Time: Davis

By a CW Staff Writer

HOT SPRINGS, Va. – There are so many checks and balances in standards making that if an agreement on an interface standard was reached today, it would take 24 months to get it on the books, Dr. Ruth Davis, director of the National Bureau of Standards' (NBS) Institute of Computer Sciences and Technology, told the Computer Industry Association's (CIA) annual conference here recently.

These checks and balances compel the bureau to set up committees and work with 205 government people in the Federal Information Processing Standards Coordinating and Advisory Group, for example.

The checks also oblige NBS to publish notices in the *Federal Register* so individuals in the private sector can comment. After the comments are received, the NBS must "rewrite our answers to the comments in the *Federal Register*, allow a 30-day moratorium, and so forth," she said.

Davis admitted the standards that have been implemented to date represent a "mixed bag," but "in order to set our requirements, we have to decide where our priorities are in the Bureau of Standards, because we never have enough resources to go around.

"We allocate our resources under conditions of scarcity," she explained.

Types Conflict

There is a conflict between the types of standards desired by users in the Federal government and those in industry, she said.

Users request standards in the areas of software, software documentation, software development and program-

(Continued on Page 41)

Peacock said.

"The price drop in the hardware portion of computer systems will be offset by a combination of inflation and an increased rise in the cost of software and support services," he explained.

Users are shifting gradually from rental to purchase of systems. Less than half, in dollar value, of the IBM 370s in use in the U.S. are owned by IBM, and the figure is even lower for older gear and for other mainframe manufacturers, Peacock said.

This is important, he said, because users it is getting set to voluntarily cut off from IBM; it would be about the third or fourth largest computer company if it were cut off, and in a year or so would be the second largest."

This group represents some of the trends worth watching for from the hardware standpoint, he emphasized.

Demise of Programmer

"The gradual demise of the programmer as we see him today" was another change Peacock predicted. Systems experts in user organizations will be more like management specialists, or information specialists, than they will be programmers per se," he said.

"Boundaries in the supply of computation or information processing are getting hazy," he continued. "Service bureaus find themselves competing with small business computers, for instance, and systems houses play both sides of the fine."

Smart terminals, information appliances, word processing and so forth bring more suppliers into the act, all offering alternative solutions, he added.

The key word for the future is "marketing," Peacock said. "The technology has a way to go, but it will get there no matter what we do. This industry is supersaturated with technologists, yet it is marketing that opens up the new vistas," he said.

IMC Gets Two-Year Export Ban For Violating Trade Regulations

WASHINGTON, D.C. – Information Magnetics Corp. (IMC) of Goleta, Calif., and its British subsidiary, Information Magnetics Ltd., have been denied export privileges for two years for violating U.S. export regulations during 1972 and 1973, the U.S. Commerce Department said here.

The department's Office of Export Administration (OEA) charged the firm with exporting more than $800,000 worth of U.S.-manufactured disk heads and related equipment for electronic computers to Eastern European countries without the required export licenses.

In addition, after the unauthorized exports had been discovered and after assurances from the company that it would observe the export regulations, the U.S. firm directed the British subsidiary in March 1974 to deliver disk heads and subassemblies valued at $108,000 to the Bulgarian Legation in London without the required U.S. or UK export control authorizations, the OEA said.

Further, in October 1974, the U.S. firm exported or caused to have exported to Poland a ferrite slicing machine and a ferrite dicing machine, valued at about $31,000, without obtaining final OEA approval.

IMC neither admitted nor denied the charges.

All outstanding validated licenses in which IMC or its subsidiary have an interest have been canceled, the Commerce Department said, warning no person may trade in goods or technical data exported or ready to be exported from the U.S. with persons or firms he knows have been restricted from dealing in U.S. exports.

The ruling provides for reinstatement of export privileges on a probationary basis after Dec. 2, 1976.

CDC Makes China, Soviet Sales

MINNEAPOLIS – Control Data Corp. has received orders totaling about $15 million from the Soviet Union and the Peoples' Republic of China for Cyber systems, the firm said.

The Soviets ordered a Cyber 76 with extensive peripherals and services for its Hydrometeorgiological Center in Moscow. The $10 million system will become part of the world weather network.

The Chinese ordered two smaller Cyber 172s, valued at nearly $5 million, for use in seismic data reduction in connection with oil exploration, a CDC spokesman said.

Applications for export licenses are pending with the U.S. Commerce Department. If the Department of Defense approves, the application will go to Cocom, an organization of North Atlantic Treaty Organization countries, for its okay.

Univac was granted an export license in June for a $10 million 1106-II multiprocessor reservations system ordered by the Russian airline Aeroflot.

In July, IBM received an export license for a 370/158, 11 System 7s and related peripherals ordered by the Soviet Union's Kama River truck foundry. That order was also valued at about $10 million.

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Interface for Drives on Way

ISS Plans to Increase OEM Penetration

By Molly Upton
Of the CW Staff

CUPERTINO, Calif. – ISS plans to increase its penetration in the OEM disk drive marketplace, including Europe, according to Everett Bahre, vice-president and general manager.

The firm intends to provide an OEM interface for its family of drives, Bahre said.

"We will have a much more aggressive approach in the non-Univac" market, he said. ISS product lines break down into Univac-compatible, IBM-compatible and OEM, most of which is for minicomputers.

Parent company Univac accounts for less than half of ISS' business; a little more than half of the non-Univac market is composed of leasing companies, with the remainder OEM, he said.

As a further indication of future plans, Bahre said ISS "is committed" to the mass storage area, such as the IBM 3850.

Currently most of ISS business is in the 100M- to 200M-byte range, although its line extends

Everett Bahre

down to the Model 714, a 29M-byte drive, he said.

The demand for 100- and 200M-byte drives is expanding and Bahre said he can see a demand for larger capacity drives coming sooner than would have been expected.

ISS "plans to stay competitive in the market" for units above 200M bytes, he said.

CW Photos by M. Upton

Maurice H. Henchey

The recent IBM announcement of the 3350 fixed disk, for which IBM drastically lowered the cost/byte of storage, should make it increasingly difficult for the competition to remain competitive and to put money into future development, Bahre said.

There is an increasing trend among new business toward the double-density products, he said.

As part of the Univac family, ISS will build a floppy disk drive for Univac, Bahre said, adding the product would also have OEM potential.

ISS also makes 36M- and 72M-byte drives for use in the Univac 90/30 family. The firm will be "analyzing the OEM potential" of this product, he added.

ISS, which was the first independent to announce a 3330-type drive, stresses the complete subsystem capability, including controllers, Maurice H. Henchey, director of marketing, said.

The firm has a 100M-byte unit, the Model 7330-11, that is field-upgradeable to 200M bytes. One controller can handle drives of both 100M and 200M bytes on the same string, he said.

GA Shake-Up Reportedly Continuing As Four Outside Directors Resign

ANAHEIM, Calif. – General Automation, Inc. (GA), has announced the resignation of its four outside directors and replaced them with three others.

No one at GA could be reached for comment, but sources said the move is part of a management shake-up that started with the resignations last summer of Raymond J. Noorda as president and Michael A. Ford as vice-president.

Those who resigned are Phillip Greer, Louis B. Lundborg, Coleman W. Morton and Henry E. North.

Replacing them are Walter P. Barker, a former director of McDonnell Douglas Corp.; Henry Ugarte, a director and vice-president of finance for Hi-Shear Corp.; and Rep. John C. Conlan (R-Ariz.).

The fourth outside board seat will remain vacant.

In announcing the new appointments, Lawrence A. Goshorn, GA president, chairman and founder, said "these changes are an integral part of the new leadership of the company," which is "committed to restore profitability this fiscal year . . . and to changes necessary to continue strengthening the company."

Other Moves

■ Amdahl Corp. has appointed Harold O. Shattuck vice-president of engineering.

■ Walter A. Collymore has been named a vice-president of Control Data Corp., with responsibility for product development of the company's data services network.

Executive Corner

■ Thomas M. Walker has been appointed a vice-president of the Systems Division of Computer Sciences Corp. and the director of the Information Sciences Center in Virginia.

■ Robert V. Henry has been appointed vice-president of engineering and advanced development of printer products at Dataproducts Corp.

■ Herman Kahn has been elected to the board of directors of Advanced Computer Techniques Corp.

■ Gary G. Friedman, executive vice-president of Itel Corp., additionally has been named vice-chairman of the company. Thomas A. Bartlett, president of Colgate University, was elected to the company's board of directors.

■ All members of the board of directors of On-Line Sysems, Inc. have been reelected by the company's stockholders.

■ Lawrence L. Mayhew has been elected a group vice-president of Tektronix, Inc.

■ Bradford A. Warner has been elected to the board of directors of Datatrol, Inc.

Company Specializes in Negotiating Contracts for Users

By Toni Wiseman
Of the CW Staff

WINTER PARK, Fla. – For the uninitiated, contract negotiations can be alternatively a headache, an ulcer and a catastrophe. A remedy may, however, be at hand.

International Computer Negotiations, Inc. (ICN) is a recently formed company which specializes solely in negotiating equipment contracts for users.

The company grew out of a perceived need. "I saw such a need, a naivete on the part of users," Joseph Auer, ICN President, said. "Not general naivete, but when it comes to contracts, people treat them much differently."

The company will not help users determine which equipment is best suited to their needs; the evaluation remains the users' concern, according to Auer, who was with Honeywell for six years.

"But once they've decided on the gear, we work with them on alternative acquisition methods and show them the trade-offs between rental, purchase and various types of financing leases," he said.

The concept behind ICN is it can bring expertise and proven experience to the user who may negotiate a contract only once every three or five years."

Contractual Considerations

"ICN has compiled and maintains a data base of contractual provisions that [a] company would probably not be aware of in the normal course of doing business," Auer said.

"These provisions can help ensure maximum contractural protection – a difficult goal for most companies to achieve in computer negotiations," he added.

There are 20 to 30 contractual considerations – such as on-going maintenance, soft-dollar considerations and time buybacks – which could be requested, Auer noted, but most people don't know enough to demand them.

ICN maintains a compilation of what various vendors are doing for customers. "We're a central source of what they're giving away here, what they've given away there," Auer said.

"We see one user getting a particular concession due to the unique nature of the sales campaign or his needs and the vendor may go a little further in that area because it doesn't have to give away some other things. Pretty soon you've got a good set of parameters of how far it'll go in each area," he said.

"The ideal thing is to get all the concessions for one client," he added.

ICN works on an incentive basis. The fee structure is a minimal retainer plus a reasonable percentage of the customers' savings, Auer said.

For example, on a $6 million deal, the retainer would be $12,000 for a year. If the incentive earned was $36,000, the customer would deduct whatever it had paid of the retainer from the $36,000 and owe ICN the remainder.

ICN's incentive fee percentages vary depending upon the computer manufacturer involved, the particular equipment to be acquired, whether the equipment is new or used and the stage of negotiations, if any, when ICN is retained, Auer said.

In other words, the fee can be a percentage of the user's savings from the total price of new equipment, a percentage of the user's savings above a predetermined discount from the total price of used or new equipment involving a trade-in or a percentage of the user's savings above the user's own negotiated "best price," Auer explained.

As an additional service to its subscribers, ICN also maintains a file of all clients' resources for identification of nonvendor sources of acquisition and disposition. Auer stressed that this is not brokering, but merely a spin-off service.

Contracts

Computer Sciences Corp. has received a contract valued at about $4 million to provide computer-based services in support of the National Aeronautics and Space Administration's worldwide space flight tracking and data network.

Datatrol, Inc. has received contracts from the First Seneca Bank & Trust Co. and the Pennsylvania Bank & Trust Co. for an on-line teller information system.

Qume Corp. has received a $1.9 million contract from Anderson Jacobson, Inc. for Qume Model Q30 and Sprint 45 character printers.

TRW, Inc. has received a $52.2 million contract from the U.S. Air Force for communications satellites.

Sysorex International, Inc. has been awarded a $2 million contract by the Saudi Arabian army for the development of a computer-controlled micrographic storage and retrieval system.

Anacomp, Inc. has received a facilities management contract from various county agencies in Key West, Fla., for the establishment of a countywide DP cooperative.

Control Data Corp.'s Aerospace Division has been awarded a $1 million follow-on contract from E-Systems for additional quantities of the 469 microcomputer to be used in a low-altitude, long-range cruise missile guidance system.

Incoterm Corp. has received a $650,000 contract from Iberia Airlines for SPD 10/30 intelligent computer terminals and peripheral devices for use in the airline's Resiber II communications reservation system.

Sanders Associates, Inc. has received a $1 million contract from the Simulation Products Division of the Singer Co. for SA-900 graphic display systems for use in helicopter pilot flight-training systems.

Telos Computing, Inc. has been awarded a contract valued at about $500,000 from the Naval Electronic Systems Engineering Center in San Diego, Calif., to provide test, evaluation and training plans for an automated command and control training system.

Intertel, Inc. has been awarded a contract for 2,400 bit/sec modems from GTE Information Systems, Inc. The modems will be a part of a GTE/IS pact to expand the Bache Automated Communications Order Match data communications system.

Evolution 'More Insidious' Than Revolution

By a CW Staff Writer

HOT SPRINGS, Va. – IBM's subtle evolutionary developments can have a "more insidious effect" on change than new design approaches like its Future Systems, Gideon Gartner, vice-president of Oppenheimer & Co., warned computer industry executives here.

"The computer industry should be as concerned about evolution as it is about revolution," he told attendees of the Computer Industry Association's (CIA) annual meeting. One example of this is the IBM 370, which Gartner noted has been called an example of evolutionary rather than revolutionary development by Quantum Sciences Corp.

Gartner also cited IBM's evolution toward a purchase environment. "IBM will still push rental, but the trend toward purchase may be a tactic of last resort," he said.

Purchase plans could be most difficult for plug-compatible manufacturers (PCM) to deal with, barring an exit from the business, since PCMs wouldn't have come about at all had it not been for IBM's rental base, he said.

Pointing to the fact that it takes at least a year for PCMs to make their first shipments of an IBM-compatible product after the original IBM products are shipped, Gartner warned this is an area deserving careful scrutiny.

The notion that IBM is moving toward functional pricing is a major misconception against which the industry must guard, he went on. IBM previously employed functional or transactional pricing – that is, charged for extra shift usage – but the change to a single static shift charge was made in response to competition, and that competition is still there.

Gartner also cautioned the industry must be careful when determining IBM's market share "because we are dealing with flakey information. Do we measure it by revenues, by value of shipments – and in that case, gross or net?"

IBM Purchase of CML Ties Up Industry Pieces

By Catherine Arnst
Of the CW Staff

HOT SPRINGS, Va. – IBM's purchase of a controlling interest in CML Corp., Comsat's domestic satellite subsidiary, has brought the concept of System Network Architecture (SNA) just over the horizon, Jules Garfunkel, a computer securities analyst with E.F. Hutton Co., said here recently.

Superimposing a digital network common carrier ability on the DP industry ties the separate pieces together, he said at the Computer Industry Association's (CIA) annual meeting.

"Individual systems or subsystems that were once sold to separate markets for different functions can now be viewed as an integrated entity – an entity with new proportions, new capabilities," he said.

The Federal Trade Commission has already named it "the integrated business information handling industry," he said.

IBM's acquisition of a common carrier capability has served to focus the attention of the computer industry, investment community and government on the future integrated information-handling industry, Garfunkel said, adding that this future "will provide new opportunities to computer companies for expanded growth."

The companies most successful in participating in this growth phase will be "those that can provide the greatest number of parts or at least fully integrated parts of the total solution of 'total system services,'" he said.

The computer industry will move into a new stage of development when the computer's abilities will be coordinated and integrated to provide full-service, end-to-end information processing from the point of data creation to its ultimate destination and storage, he said.

"This total systems concept, now made possible by the apparent integration of data processing with digital transmission, will be the key to a new phase of growth," he added.

This growth will at first continue to highlight better intracompany electronic document communications through word processing and specialized industry terminals, Garfunkel said.

From there, he predicted, the industry will concentrate on intercompany communications, thus hastening electronic funds transfer systems, a cashless and checkless society, a centralized stock exchange and electronic mail.

"We will see the beginning of a shift away from the renting or selling of hardware and toward the selling of solutions," he concluded.

CW at CIA

System Reliability Crucial

By a CW Staff Writer

HOT SPRINGS, Va. – System reliability is the area that deserves the most attention by the computer industry, a time-sharing industry executive told attendees at the Computer Industry Association (CIA) annual meeting here recently.

"Anytime a system goes down, for whatever reason, user service is interrupted, revenue stops and network credibility suffers," John Luke, president of CSC Infonet, explained.

"The range between success and failure in providing reliability is extremely narrow – anything below 97% reliability for the network is unacceptable," he said.

"Trying to raise this level becomes exceedingly expensive with each fractional gain made," he added.

The problem of maintaining a suitable level of reliability is compounded by the conglomeration of equipment, vendor involvement and other things that make up a network.

"For example," he said, "when a failure occurs, areas represented by a number of vendors may require investigation and trouble analysis to pinpoint the cause.

"Because the prevailing belief seems to be that it has got to be the other fellow's equipment that's not working, we sometimes have a problem in obtaining the response needed," he said.

Along with high reliability components comes a need for improved diagnostic and error-detection capabilities, Luke noted.

To maintain a proper level of service, a vendor must be able to perform fault isolation and repair quickly, he said. The ability to run remote diagnostic tests to pinpoint a defective printed circuit board within a unit would be extremely beneficial to network vendors, he added.

"Another contributor to reliability is graceful degradation," he said, explaining a reduced level of performance is preferred over a complete shutdown of the network.

"Perhaps more fail-safe and redundant circuits could be used for key functions to ensure equipment reliability."

"Additionally, if warnings of impending catastrophic failure of an equipment are given, there might be time to correct the problem or start preparation of some alternate means to keep the system in operation," he said.

Standards Time-Consuming: Davis

(Continued from Page 37)

ming language standards, she said, adding "we have one programming language standard – Cobol. Fortran is always about to become a standard in the government and we are working on two others – Basic and APL."

Industry, Congress and the General Accounting Office (GAO) want standards that will increase competition or reduce costs and efficiency, such as interface standards, she said.

NBS has three basic choices in determining standards, Davis explained. "One is to wait until there are de facto standards – whether they are set by Telenet, IBM, Datapac – and then either adopt or reject to null and void that de facto standard.

"The second choice is to wait until there's a voluntary standard set up by a voluntary standards organization, such as the American National Standards Institute [Ansi], and then adopt or diverge from it.

"The third option is to start out regardless of what Ansi is doing and regardless of whether there are de facto standards or not and develop a federal standard."

The only justification for developing a federal standard when the first two situations do not exist is when there is sufficient pressure for that standard from federal agencies, Congress, the GAO or the private sector, Davis said.

There are 31 mandatory standards at present, but they are actually only "mandatory unless waived," she said.

"We always waive a standard – with the exception of Cobol, since we now have a software testing service – if a government agency asks us to do so.

"We don't intend to always do so, particularly as we get a little better at standards making and there are better ways of ensuring compliance. There have not been many requests for waivers either," she said.

Guide Lists Rules On Depreciation

CHICAGO – Puzzled on how to depreciate equipment? The Commerce Clearing House (CCH) has published a 1975 Depreciation Guide that covers various depreciation schedules.

The 176-page guide covers rules on regular depreciation and then the Asset Depreciation Range system with its ranges and repair allowance percentages, as well as Class Life System for post-1970 depreciation on pre-1971 assets.

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Accounts Payable System

McCORMACK & DODGE CORPORATION
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Burroughs, CDC Earnings Rise in Nine Months...

Control Data Corp. and Burroughs Corp. each showed improved results in the third quarter and nine months compared with the year-ago figures.

Burroughs kept up its momentum in setting records, while CDC's computer results were unencumbered by the $30.2 million in special charges last year stemming from the Union Bank of Switzerland's decision to terminate a development program.

At Burroughs, third-quarter earnings rose 7% to $27.5 million or 69 cents a share compared with $25.8 million or 66 cents a share in the same period last year.

Revenues rose 6% to $367.7 million compared with $346.7 million a year ago.

For the nine months, Burroughs' earnings rose 13% to $91.6 million or $2.31 a share compared with $81.1 million or $2.08 a share in the same period last year.

Revenues in the nine months totaled $1.15 billion, a 10% increase over the $1.05 billion reported in the 1974 period.

Burroughs' total worldwide orders for the nine months increased 3% over the same period last year. Worldwide backlogs continued at a high level, showing a 20% increase since the beginning of the year.

At CDC, computer income increased for both the third quarter and nine months, while contributions from its Commercial Credit financial services subsidiary declined.

Consolidated earnings for the third quarter were $9.6 million or 58 cents a share compared with $7.1 million or 44 cents a share in the year-ago period.

The 1974 period's loss was the result of a special charge of $30.2 million before taxes.

Computer business profits rebounded to $5.1 million in the third quarter from a loss of $13.9 million a year earlier. Revenues increased 8.8% to $310.2 million from $285.2 million.

Income from Commercial Credit Co. declined to $5 million from $7.2 million in the year-ago quarter.

"Rental and services revenues showed encouraging gains," according to William C. Norris, CDC chairman. "Most improvements came in data services and in systems.

"Programs to streamline operations and more effectively manage assets are continuing to show positive results. Computer business indebtedness has declined about $60 million from a high of $730 million a year ago," he said.

"Shipments of the first Model 172, Model 173 and Model 175 computers in the Cyber 170 family were made during the quarter and shipment rates will accelerate in the fourth quarter," he predicted.

"On the other hand, shipments of peripheral products to other systems manufacturers began to slow as the result of order downturns experienced earlier."

Consolidated earnings for the nine months reached $31.6 million or $1.94 a share compared with earnings of $18.1 million or $1.14 a share in the same 1974 period.

Computer business profit for the nine months totaled $7.6 million on revenues of $891.6 million. This compared with a loss of $7.1 million on revenues of $818 million in the first nine months of 1974.

Commercial Credit showed income of $25.2 million compared with $26.4 million in the year-ago period. Results were adversely affected by larger underwriting losses in insurance operations, Norris said.

...While IBM Gains 'Modest' 1%

ARMONK, N.Y. – A 4% increase in IBM's third-quarter earnings helped the firm show almost a 1% increase in earnings for the nine months ended Sept. 30.

Revenues jumped more than 15% over the third quarter of 1974.

Reaching a record level of $495.2 million or $3.32 a share, the third-quarter earnings reflected a greater than 9% increase in outright sales.

"Although the level of outright purchases of DP equipment has continued to increase quarter by quarter through 1975, the nine months total is still below the comparable 1974 period," according to Frank T. Cary, IBM chairman.

"This factor, together with the continuing effects of worldwide inflation, has held the increase in nine months net earnings to a very modest amount, despite an appreciable growth in gross income," he said.

In other 1975 quarters, IBM's net rose a little more than 1% in the first quarter, but was off almost 3% in the second quarter.

Outright sales for the first half were more than 13% below those of the year-ago period, while rental and services increased almost 20%.

During the third quarter, income from sales rose to nearly $1.099 billion from $1.005 billion in the year-ago period. Rentals and services jumped more than 18% to $2.5 billion from $2.1 billion in the same period last year.

Third-quarter revenues rose more than 15% to a record $3.6 billion compared with $3.13 billion in the year-ago period. Earnings for the 1974 period were $477.3 million or $3.23 a share.

For the nine months, earnings totaled $1.4 billion or $9.41 a share compared with $1.39 billion or $9.45 a share in the same period last year.

There was an increase in the number of shares, which IBM said was primarily due to its employee purchase plan.

Revenue in the nine months climbed more than 10% to a record $10.37 billion from $9.39 billion in the year-ago period.

Outright sales for the nine months declined more than 6% to $3.02 billion from $3.2 billion in the same period last year while revenue from rentals and services grew more than 19% to $7.35 billion compared with $6.17 billion in last year's period.

IBM's "other income," principally interest, dropped 20% in the third quarter to $73.8 million from $92.4 million in the year-ago quarter. However, it rose 13% for the nine months to $251.1 million.

Earnings Reports

INCOTERM
Three Months Ended Aug. 23

	1975	1974
Shr Ernd	$.29	$.06
Revenue	7,999,000	5,217,000
Earnings	585,000	115,000
6 Mo Shr	.65	.....
Revenue	15,612,000	8,068,000
Spec Cred	193,000	.....
Earnings	1,298,000	(671,000)

IDENTICON
Three Months Ended June 30

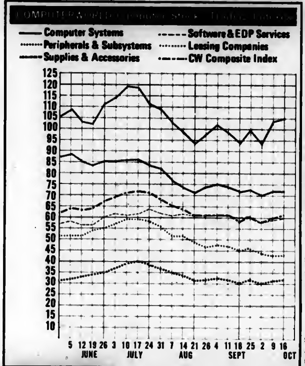
	1975	1974
Revenue	$268,170	$88,728
Loss	101,517	161,520

DATA DESIGN LABORATORIES
Year Ended June 30

	1975	1974
Shr Ernd	$.68	$.73
Revenue	17,885,000	16,423,000
Earnings	747,000	803,000
3 Mo Shr	.24	.30
Revenue	5,196,000	5,212,000
Earnings	263,000	330,000

MULTIPLE ACCESS
Three Months Ended June 30

	1975	1974
Shr Ernd	$.25	$.37
Revenue	9,995,348	8,977,209
Earnings	709,672	1,049,817



MICROFORM DATA SYSTEMS
Year Ended Aug. 1

	a1975	b1974
Shr Ernd	$.38	$.05
Revenue	20,180,864	8,278,906
Tax Cred	1,036,000	130,000
Earnings	2,030,336	270,182

a-Includes Icot Corp. from date of acquisition, Sept. 29, 1974. b-Restated to reflect change in accounting for R&D costs.

TEKTRONIX
Three Months Ended Aug. 23

	1975	a1974
Shr Ernd	$.66	$.61
Revenue	74,858,000	72,840,000
Earnings	5,760,000	5,310,000

a-Thirteen-week period; restated for Lifo accounting.

WALLACE BUSINESS FORMS
Year Ended July 31

	1975	1974
Shr Ernd	$2.18	$2.04
Revenue	65,582,000	55,719,000
Earnings	4,130,000	3,700,000

ADDRESSOGRAPH MULTIGRAPH
Year Ended July 31

	1975	1974
Shr Ernd	$.81	$.04
Revenue	584,246,000	540,833,000
Earnings	a4,908,000	308,000
3 Mo Shr	.33	.....
Revenue	155,051,000	151,278,000
Earnings	a2,636,000	(1,497,000)

a-Earnings reduced by $829,000 after gain of $1.1 million on a sale of German subsidiary, tax credit of $1.6 million in terminating a Brazilian subsidiary and $3.5 million estimated expenses in restructuring several operations.

DATARAM
Year Ended April 30

	1975	1974
Shr Ernd	$1.27	a$1.39
Revenue	5,997,835	5,322,728
Tax Cred	492,000	352,000
Earnings	848,993	709,326

a-Adjusted to reflect a one-for-five reverse stock split in February 1975.

QUANTOR
Year Ended July 31

	1975	1974
Shr Ernd	$.28	$.07
Revenue	13,241,022	7,284,760
Tax Cred	335,000	120,598
Earnings	715,524	264,788

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, OCTOBER 15, 1975

All statistics compiled, computed and formatted by TRADE★QUOTES, INC. Cambridge, Mass. 02139

EXCH		1975 RANGE (1)	CLOSE OCT 15 1975	WEEK NET CHNGE	WEEK PCT CHNGE
	COMPUTER SYSTEMS				
N	BURROUGHS CORP	62-109	91	-5 1/4	-5.4
C	COMPUTER AUTOMATION	2- 10	10 1/4	+ 1/2	+5.1
N	CONTROL DATA CORP	11- 23	20 1/4	+ 7/8	+4.5
N	DATA GENERAL CORP	10- 38	37 7/8	+1 1/4	+3.4
O	DATAPOINT CORP	6- 26	24	+ 3/4	+3.2
C	DIGITAL COMP CONTROL	1- 4	2 3/4	0	0.0
N	DIGITAL EQUIPMENT	46-135	131 1/2	+2	+1.5
N	ELECTRONIC ASSOC.	2- 3	2 1/8	0	0.0
A	ELECTRONIC ENGINEER.	5- 10	8 7/8	+ 1/2	+5.9
N	FOXBORO	23- 42	28 1/8	+1 1/4	+4.6
O	GENERAL AUTOMATION	5- 14	4 5/8	-1	-17.7
C	GRI COMPUTER CORP	1- 1	5/8	0	0.0
N	HEWLETT-PACKARD CO	58-120	101 5/8	-1 3/4	-1.6
N	HONEYWELL INC	22- 40	31 7/8	+1 7/8	+6.2
N	IBM	158-224	208 3/4	+2 3/4	+1.3
C	MEMOREX	1- 10	9 1/2	- 1/4	-2.5
O	MICRODATA CORP	2- 6	5 7/8	+ 1/4	+4.4
C	MODULAR COMPUTER SYS	5- 19	11 1/4	0	0.0
N	NCR	15- 39	24 3/8	- 1/8	-0.5
O	PRIME COMPUTER INC	2- 6	4 3/4	0	0.0
N	PERKIN-ELMER	16- 30	25 3/4	+1 5/8	+6.7
N	RAYTHEON CO	26- 59	56 1/8	+2 5/8	+4.9
N	SINGER COMPANY	10- 17	11 3/4	+ 5/8	+5.6
N	SPERRY RAND	26- 49	42 5/8	0	0.0
A	SYSTEMS ENG. LABS	1- 5	3 1/8	0	0.0
N	VARIAN ASSOCIATES	7- 18	14 1/2	- 1/4	-1.6
N	WANG LABS.	7- 17	11 3/8	+ 1/2	+4.5
N	XEROX CORP	51- 86	81 3/4	+3	+5.1
	LEASING COMPANIES				
O	COMDISCO INC	1- 5	3 1/4	- 1/8	-3.7
A	COMMERCE GROUP CORP	2- 4	2 5/8	+ 1/8	+5.0
A	COMPUTER INVSTRS GRP	1- 2	5/8	0	0.0
N	DATRONIC RENTAL	1- 1	1/2	0	0.0
A	DCL INC	0- 1	3/8	0	0.0
N	DPF INC	3- 8	4 1/2	- 1/8	-2.7
O	EDP RESOURCES	1- 2	1	0	0.0
A	GRANITE MGT	1- 5	4 1/8	0	0.0
A	GREYHOUND COMPUTER	2- 3	2 5/8	+ 1/8	+5.0
A	ITEL	3- 9	6 1/2	0	0.0
N	LEASCO CORP	4- 8	6 3/4	- 1/8	-1.8
O	LEASPAC CORP	1- 1	1/4	0	0.0
O	LECTRO MGT INC	1- 1	1/8	0	0.0
O	NRG INC	0- 4	1/2	- 1/4	-33.3
A	PIONEER TEK CORP	2- 7	5 5/8	+ 1/8	+2.2
A	ROCKWOOD COMPUTER	1- 1	1/8	0	0.0
N	U.S. LEASING	7- 14	8 1/8	+1 5/8	+25.0
	SOFTWARE & EDP SERVICES				
O	ADVANCED COMP TECH	1- 1	7/8	+ 1/8	+16.6
A	APPLIED DATA RES.	1- 10	1 3/4	+ 1/8	+7.6
N	AUTOMATIC DATA PROC	29- 65	59 3/8	+5 7/8	+10.9
O	BRANDON APPLIED SYST	1- 1	1/8	0	0.0
O	CENTRAL DATA SYSTEMS	3- 7	7 3/8	0	0.0
C	COMPUTER DIMENSIONS	2- 6	3	0	0.0
C	COMP ELECTION SYSTMS	3- 6	6	+ 1/4	+4.3
C	COMPUTER HORIZONS	1- 1	1	+ 1/8	+14.2
C	COMPUTER NETWORK	1- 3	2 7/8	+ 1/4	+9.5
N	COMPUTER SCIENCES	2- 6	5	0	0.0
O	COMPUTER TASK GROUP	1- 1	5/8	0	0.0
O	COMPUTER USAGE	2- 4	2 1/4	+ 1/8	+5.8
O	COMSHARE	3- 4	2 3/4	+ 1/8	+4.7
O	DATATAB	1- 2	7/8	- 1/4	-22.2
A	ELECT COMP PROG	1- 1	1/8	- 1/8	-50.0
N	ELECTRONIC DATA SYS.	12- 28	15 1/8	- 1/8	-0.8
O	INFONATIONAL INC	1- 1	1/8	0	0.0
C	LPS COMPUTER MARKET.	1- 1	5/8	0	0.0
O	KEANE ASSOCIATES	2- 3	2 3/8	+ 3/8	+18.7
O	KEYDATA CORP	2- 3	2	0	0.0
O	LOGICON	3- 5	3 1/2	+ 1/8	+3.7
A	MANAGEMENT DATA	1- 3	1 7/8	+ 1/8	+7.1
O	NATIONAL CSS INC	6- 14	11 5/8	+ 1/8	+1.0
O	NATIONAL COMPUTER CO	1- 1	1/8	0	0.0
A	ON LINE SYSTEMS INC	8- 17	13 1/2	+1 1/2	+12.5
N	PLANNING RESEARCH	2- 6	3 3/4	+ 1/8	+3.4
O	PROGRAMMING & SYS	1- 1	5/8	0	0.0
O	RAPIDATA INC	2- 5	2 7/8	+ 1/4	+9.5
O	REYNOLDS & REYNOLD	10- 24	13 1/2	0	0.0
O	SCIENTIFIC COMPUTERS	1- 1	1	0	0.0
O	SIMPLICITY COMPUTER	1- 1	1 1/8	+ 1/8	+12.5
O	TYMSHARE INC	7- 21	18 1/2	+1 3/8	+8.0
A	URS SYSTEMS	2- 4	3	0	0.0
N	WYLY CORP	2- 4	3	- 3/8	-11.1
	PERIPHERALS & SUBSYSTEMS				
N	ADDRESSOGRAPH-MULT	4- 9	8 1/8	+ 1/2	+6.5
C	ADVANCED MEMORY SYS	1- 7	5 1/2	+ 1/4	+4.7
N	AMPEX CORP	3- 7	5 5/8	- 1/8	-2.1
O	ANDERSEN JACOBSON	1- 3	1 3/4	- 1/4	-12.5
O	BEEHIVE MEDICAL ELEC	1- 5	3 3/8	0	0.0
A	BOLT,BERANEK & NEW	5- 13	9 1/8	- 1/8	-1.3
N	BUNKER-RAMO	4- 8	5	0	0.0
A	CALCOMP	4- 7	3 3/4	0	0.0
O	CAMBRIDGE MEMORIES	2- 5	2 5/8	- 1/4	-8.6
R	CENTRONICS DATA COMP	7- 25	18 7/8	+1 1/8	+6.3
O	CODEX CORP	15- 38	35	+ 1/2	+1.4
C	COGNITRONICS	1- 2	3/4	0	0.0
O	COMPUTER COMMUN.	1- 2	3/4	0	0.0
O	COMPUTER CONSOLES	3- 7	4	- 1/4	-5.8
A	COMPUTER EQUIPMENT	1- 2	1 1/2	0	0.0
O	COMPUTER MACHINERY	1- 2	1	- 1/8	-11.1
C	COMPUTER TRANSCEIVER	1- 2	5/8	+ 1/8	+25.0
C	CONTEN	2- 5	3 3/8	+ 3/8	+12.5
N	CONRAC CORP	12- 24	23 1/4	+2 1/4	+10.7
O	DATA ACCESS SYSTEMS	1- 3	1 1/4	- 1/4	-16.6
O	DATA 100	5- 16	10 3/4	+ 1/2	+4.8
A	DATA PRODUCTS CORP	2- 6	3 3/4	- 1/4	-6.2
O	DATA TECHNOLOGY	1- 3	1 3/8	- 1/8	-8.3
C	DATUM INC	1- 2	1	0	0.0
O	DECISION DATA COMPUT	4- 7	4	0	0.0
O	DELTA DATA SYSTEMS	1- 1	1/4	0	0.0
O	DI/AN CONTROLS	1- 1	3/4	0	0.0
N	ELECTRONIC M & M	1- 3	1 1/2	0	0.0
O	FABRI-TEK	1- 1	7/8	0	0.0
C	GENERAL COMPUTER SYS	1- 2	1	0	0.0
N	HAZELTINE CORP	3- 6	3 3/4	- 1/8	-3.2
N	HARRIS CORP	18- 28	26 1/4	+2 3/8	+9.9
A	INCOTERM CORP	3- 12	10	- 1/8	-1.2
O	INFOREX INC	2- 5	2 7/8	+ 3/8	+15.0
O	INFORMATION INTL INC	8- 14	13 3/4	+ 5/8	+4.7
A	LUNDY ELECTRONICS	3- 3	2 7/8	0	0.0
C	MANAGEMENT ASSIST	1- 1	3/8	0	0.0
A	MILGO ELECTRONICS	8- 24	17 1/4	+2 1/2	+16.9
A	MOHAWK DATA SCI	1- 8	3 1/2	+ 1/8	+3.7
O	OPTICAL SCANNING	1- 3	2 5/8	0	0.0
O	PENRIL CORP	2- 2	3/4	0	0.0
O	PERTEC CORP	2- 8	4 1/2	+ 1/8	+2.8
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	PRECISION INST.	1- 1	1/4	- 1/4	-50.0
O	QUANTOR CORP	2- 6	4 1/8	+ 1/8	+3.1
C	RECOGNITION EQUIP	2- 9	7 1/4	+ 5/8	+9.4
N	SANDERS ASSOCIATES	3- 11	7 3/4	- 1/4	-3.1
O	SCAN DATA	1- 3	1 5/8	0	0.0
O	STORAGE TECHNOLOGY	8- 17	14	+ 3/4	+5.6
O	SYCOR INC	5- 15	14 3/4	+1 1/4	+9.2
O	T BAR INC	3- 6	6 1/4	0	0.0
C	TALLY CORP.	1- 5	3 1/8	0	0.0
O	TEC INC	1- 4	3	0	0.0
N	TEKTRONIX INC	18- 43	39 1/2	- 1/4	-0.6
N	TELEX	1- 3	2 1/2	- 1/2	-16.6
O	WANGCO INC	4- 9	7 1/2	+2 1/4	+42.8
C	WILTEK INC	1- 4	2 1/2	0	0.0
	SUPPLIES & ACCESSORIES				
O	BALTIMORE BUS FORMS	4- 5	4 1/2	0	0.0
A	BARRY WRIGHT	5- 7	6	- 1/8	-2.0
O	CYBERNATICS INC	0- 1	3/8	0	0.0
A	DATA DOCUMENTS	29- 42	31 3/4	- 1/4	-0.7
O	DUPLEX PRODUCTS INC	12- 25	15 1/2	+ 3/8	+2.4
N	ENNIS BUS. FORMS	5- 7	4 7/8	0	0.0
O	GRAHAM MAGNETICS	5- 10	8	- 1/4	-3.0
O	GRAPHIC CONTROLS	8- 21	13	+1	+8.3
N	3M COMPANY	43- 68	58	+2 5/8	+4.7
C	MOORE CORP LTD	39- 51	44 3/4	- 1/2	-1.1
N	NASHUA CORP	11- 22	11 5/8	+ 1/4	+2.1
C	STANDARD REGISTER	11- 20	16	+ 1/4	+1.5
C	TAB PRODUCTS CO	4- 8	5	- 3/4	-13.0
N	UARCO	17- 24	18 1/2	+ 1/4	+1.3
O	VANIER GRAPHICS CORP	4- 7	4 1/2	0	0.0
A	WABASH MAGNETICS	3- 5	4	0	0.0
N	WALLACE BUS FORMS	15- 25	16 7/8	0	0.0

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L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
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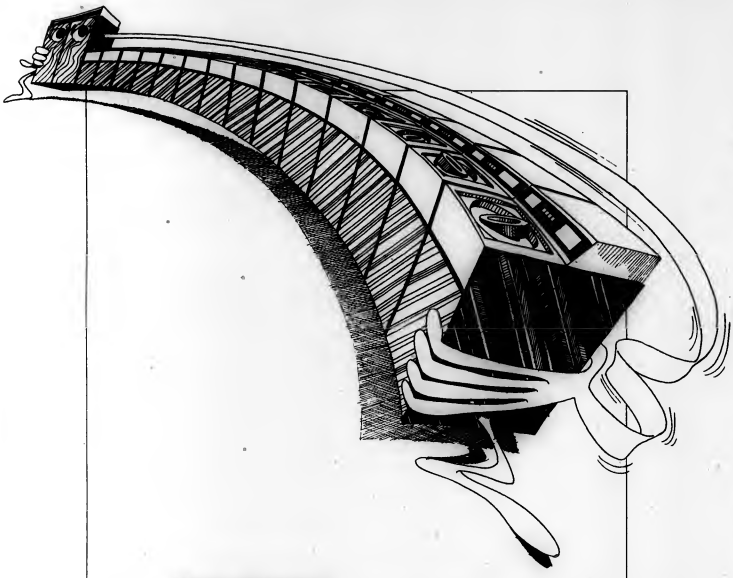

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